General Education Review 2014
CSU Maritime Academy

Proteus, Shape-shifting God of the Sea (Greek)

Table of Contents

Part I: Cal Maritime: History[1]

The California Maritime Academy is located in Vallejo, California, thirty miles north of San Francisco. It is one of only seven degree-granting maritime academies in the United States and the only one located on the West coast. It is a unique and specialized campus of the California State University that offers licensed and non-licensed degree programs to meet the diverse needs of the maritime industry. Cal Maritime's small size belies a complex structure: it is a campus of the California State University and is thus enjoined with that system's educational aims, objectives, and mandates, but it is also a federally-sponsored maritime academy under the auspices of the U.S. Maritime Administration and, therefore, bound by specific regulations and requirements which are overseen by the U.S. Coast Guard for the certification of merchant marine officers under U.S. law and the International Standards of Training, Certification, and Watchkeeping (STCW).

Cal Maritime traces its roots to 1929, when the California State Legislature founded the California Nautical School. The original purpose of the institution was to give practical and theoretical instruction in navigation, seamanship, steam engines, gas engines, and electricity in order to prepare young men for service as officers in the American merchant marine. The school received its first ship in 1931 along with a 50 acre site in Tiburon, Marin County.

In 1939, the California Nautical School changed its name to The California Maritime Academy and was relocated in 1943 to a permanent site at Morrow Cove, on the San Pablo Bay in Vallejo. In the early nineteen-seventies, Cal Maritime became a four-year college with majors in Nautical Industrial Technology and Marine Engineering Technology. Later, programs in Mechanical Engineering and Business Administration were added. In 1995, Cal Maritime became the 22nd campus of the California State University, and soon thereafter, Cal Maritime expanded its curriculum by introducing majors in Facilities Engineering Technology and Global Studies and Maritime Affairs. An online graduate program – a Master's of Science in Technology Engineering Management -- was approved and launched in 2011.

Enrollment at Cal Maritime has grown steadily from 500 students in 1995 to 1044 students this year. In the fall of 2008, the Academy opened a new state-of-the-art Marine Simulation Center – one of the world's most advanced facilities for maritime teaching, training and research. A new 132-bed residence hall opened in the fall of 2009, and a new 25,000 foot Dining Center was completed in the fall of 2013. A $26.5 million Physical Education and Aquatic Center is scheduled to open in 2014. The last decade has been witness to an exciting era in the history of Cal Maritime – one marked by expansion and new opportunities as the institution balances its proud traditions with the need to adapt to an increasingly complex and globalized 21st century.

The California Maritime Academy has been nationally recognized this year by U.S. News and World Report's annual college rankings: Cal Maritime is the number one best public college in the western region and the number one best value in the west. In the overall rankings among western regional colleges, Cal Maritime placed second. These rankings followed the Forbes report on America's top colleges which listed Cal Maritime as the number three best value among all California colleges and universities. http://colleges.usnews.rankingsandreviews.com/best-colleges/california-maritime-academy-1134

Campus Mission, Vision, and Values

The institution is committed to providing a superior education in business, engineering, operations and policy of transportation and related fields of the maritime world. Concomitant to this objective is the provision of knowledge, skills, experiences, and perspectives to enable students to make connections among disciplines and expand their intellectual capacities to take part in a wide range of human interests and activities. Our educational community subscribes to the following ideals:

- Provide each student with a college education combining intellectual learning, applied technology, leadership development, and global awareness.

[1] Interim WASC report, May 2014

- 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.

Cal Maritime's vision provides a compelling conceptual image of the future we will create for this institution:

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.

As noted above, Cal Maritime is a campus of the California State University and thus enjoined with that systems educational aims and objectives. More autonomously, Cal Maritime values and maintains a system of beliefs and principles including the significance of experiential learning, the development of personal and professional ethics, and the importance of student- centered inquiry to confront the personal, moral, and social problems that are an inevitable part of human life.

Part II. Title 5 and the CSU: Frameworks for Excellence

The following legislation provides guiding principles for the general education programs at Cal Maritime.

1. Title 5, California Code of Regulations, Section 40405: General Education-Breadth Objectives.

General education-breadth requirements in The California State University are so designed that, taken with the major depth program and elective credits presented by each candidate for the bachelor's degree, they will assure that graduates from the several campuses in the system have made noteworthy progress toward becoming truly educated persons. Particularly, the purpose of the breadth requirements is to provide means whereby graduates:

- will have achieved the ability to think clearly and logically, to find and critically examine information, to communicate orally and in writing, and to perform quantitative functions;
- will have acquired appreciable knowledge about their own bodies and minds, about how human society has developed and how it now functions, about the physical world in which they live, about the other forms of life with which they share that world, and about the cultural endeavors and legacies of their civilizations;
- will have come to an understanding and appreciation of the principles, methodologies, value systems, and thought processes employed in human inquiries.

It is the intent of this section that the general education-breadth requirements be planned and organized in such a manner that students will acquire the abilities, knowledge, understanding, and appreciation suggested as interrelated elements and not as isolated fragments.

2. The CSU: Executive Order 1065 6.2 Campus Responsibility: 6.2.1 Development and Revision of Campus Requirements (2011)

Campus faculty have primary responsibility for developing and revising the institution's particular general education program. Within the CSU General Education Breadth distribution framework, each CSU campus is to establish its own requirements and exercise creativity in identifying courses, disciplines, and learning outcomes. In undertaking this task, careful attention should be given to the following:

a. Assuring that General Education Breadth requirements are planned and organized so that their objectives are perceived by students as interrelated elements, not as isolated fragments.

b. Considering the organization of approved courses so that students may choose from among a variety of "cores" or "themes," each with an underlying unifying rationale.

c. Periodically reviewing approved courses to ensure that they remain responsive to the essential learning outcomes framework identified in Section 3.2.

d. Using evidence of student attainment of learning outcomes to inform the ongoing design of General Education curriculum and instruction.

e. Considering the possibility of incorporating integrative courses, especially at the upper-division level, that feature the interrelationships among disciplines and traditional general education categories.

f. Providing for reasonable ordering of requirements so that, for example, courses focusing on learning skills will be completed relatively early and those emphasizing integrative experiences will be completed relatively later.

g. Developing programs that are responsive to educational goals and student needs, rather than programs based on traditional titles of academic disciplines and organizational units.

h. Considering possibilities for innovative teaching and learning, including activity as well as observation in all general education coursework.

3. The CSU: General Education Breadth Criteria (taken from Guiding Notes for CSU General Education Course Reviewers, revised 2013)

The GE-Breadth curriculum is designed to educate students to think, write, and speak clearly and logically; to reason quantitatively; to gain knowledge about the human body and mind, the development and functioning of human society, the physical and biological world, and human cultures and civilizations; and to develop an understanding of the principles, methods, and values of human inquiry.

Part III: General Education at Cal Maritime: Past, Present, Future

In addition to the major areas of study, the California State University system requires[2] that Cal Maritime students fulfill **48 units** of General Education (GE) requirements, at least nine of which must be upper-division units.

Cal Maritime delivers a broad spectrum of GE courses as part of its mission. These courses are designed to:

1. Complement the major area of study by providing students with a foundation of skills to be applied in their majors (oral and written communication, computation and measurement, critical thinking, aesthetic analysis, scientific reasoning, and information competence)

2. Provide instructional depth and breadth to ensure that graduates have a well-rounded knowledge in the liberal arts (math, science, the social sciences and the humanities)

The objectives of Cal Maritime's General Education Breadth Requirements, consonant with those of Title 5 of the California Code of Regulations, call for graduates who successfully complete their general education coursework to possess:

1. the ability to think clearly and logically
2. the ability to find information and examine that information critically
3. the ability to reason quantitatively
4. the ability to communicate orally and in writing
5. appreciable knowledge about: their own bodies and minds; the physical world; other life forms with which they share their world; the cultural endeavors and legacies of their civilizations; how human society has developed, now functions, and may evolve
6. an understanding and appreciation of the principles, methodologies, value systems, and thought processes employed during human inquiry

Changes Since 2006

In 2006, the first attempt at a review of GE courses was conducted (see appendix for this document). In this analysis, the General Education Committee recommended three curricular changes:

1. Splitting the HIS/GOV course (**Elective 11**) into two separate courses. Until this time, breadth in the American Institutions requirement was difficult to enforce and track.
2. Splitting the HUM/S.S. course (**Elective 41**) into two separate courses. Under this designation, students could choose between courses in Areas C (Arts) and D (Social Sciences) to satisfy their upper division GE requirements, which put all programs out of compliance with Title V.
3. Designating **EGL 220** (not EGL 200) as the only course satisfying Area A3 (Critical Thinking). EGL 200 was an Area C2 course (literature), not an A1 (oral communication), which put all degree programs out of compliance with Title V.

These changes were made to all degree programs in 2006.

Present

Until today, GE courses at Cal Maritime have not consistently been categorized for breadth. The following is the first complete classification of GE courses across the Title V areas, with prior (2006-2013) designations listed on the right side of each table (shaded in gray).

[2] Per CSU Executive Order **1065:** Article 4: Subject Area Distribution

GE requirements at Cal Maritime are meant to be met through coursework in **five** areas:

Area A: focuses on three areas of communication in the English language. These courses view communication as the process of human symbolic interaction, and focus on the communication process from a rhetorical perspective, emphasizing reasoning, advocacy, organization, and accuracy. Further, courses highlight (1) both critical evaluation of, and reporting of information, and (2) effective reading, listening, speaking, and writing. The three sub-areas falling within **Area A** are:

A1	Oral Communication
A2	Written Communication
A3	Critical Thinking

To satisfy the **Area A** breadth requirement, students must complete a minimum of nine units within **Area A**, including coursework in **all three sub-areas**. Courses fulfilling Area A requirements at Cal Maritime:

2006-2013		2014	
EGL 110: Speech Communication	A1	EGL 110: Speech Communication	A1
EGL 100: English Composition	A2	ENG 120: Engineering Communication[3]	A1
EGL 200: Introduction to Literature	A3	EGL 100: English Composition	A2
EGL 220: Critical Thinking	A3	EGL 220: Critical Thinking	A3

Area B: focuses on the physical universe and its life forms. Satisfaction of the **Area B** breadth requirement must include (1) direct hands-on participation in laboratory activity, and (2) development of both a knowledge base in mathematical concepts and quantitative reasoning and the ability to apply mathematics and quantitative reasoning. The four sub-areas falling within **Area B** are:

B1	Physical Science
B2	Life Science
B3	Laboratory Activity
B4	Mathematical/Quantitative Reasoning

To satisfy **Area B** breadth requirements, students must complete a minimum of twelve units within **Area B**, including coursework in **all four sub-areas**. Courses fulfilling **Area B** requirements at Cal Maritime:

2006-2013		2014	
CHE 100: Chemistry I	B1	CHE 100: Chemistry I	B1
CHE 205: Chemistry of Plant Processes	B1	CHE 205: Chemistry of Plant Processes	B1
MSC 100: Intro. to Geo. and Chemical Oceanography	B1	MSC 100: Intro. to Geo. and Chemical Oceanography	B1
MSC 200: Oceanographic Instruments	B1	MSC 200: Oceanographic Instruments	
PHY 100: Physics I	B1	PHY 100: Physics I	B1

[3] This two-unit course does not fully satisfy the breadth requirement for oral communication.

PHY 105: Physics II	B1	PHY 105: Physics II	B1
PHY 200: Engineering Physics I	B1	PHY 200: Engineering Physics I	B1
PHY 205: Engineering Physics II	B1	PHY 205: Engineering Physics II	B1
MSC 105: Intro. to Bio. and Phys. Oceanography	B1 or B2	MSC 105: Intro. to Bio. and Phys. Oceanography	B2
MSC 205: Marine Biology	B2	MSC 205: Marine Biology	B2
NAU 330: Meteorology	B2	NAU 330: Meteorology	B2
CHE 100L: Chemistry I Lab	B3	CHE 100L: Chemistry I Lab	B3
PHY 100L: Physics I Lab	B3	PHY 100L: Physics I Lab	B3
PHY 200L: Engineering Physics I Lab	B3	PHY 200L: Engineering Physics I Lab	B3
BUS 205: Business Statistics	B4	MTH 107: Elementary Statistics (name changed)	B4
MTH 100: College Algebra and Trig.	B4	MTH 100: College Algebra and Trig.	B4
MTH 105: Finite Math	B4	MTH 105: Finite Math	B4
MTH 200: Technical Calculus I	B4		
MTH 201: Technical Calculus II	B4		
MTH 205: Calculus for Business	B4	MTH 205: Calculus for Business	B4
MTH 210: Calculus I	B4	MTH 210: Calculus I	B4
MTH 211: Calculus II	B4	MTH 211: Calculus II	B4
MTH 212: Calculus III	B4	MTH 212: Calculus III	B4
MTH 215: Differential Equations	B4	MTH 215: Differential Equations	B4

Area C: focuses on the arts, literature, philosophy, and foreign languages. Course offerings promote student understanding of the relationships between the creative arts, the humanities, and the self. Studies in **Area C** must include exposure to both Western and non-Western cultures. The two sub-areas falling within **Area C** are:

C1	Arts (Art, Dance, Music, Theatre, Film)
C2	Humanities (Literature, Philosophy, Foreign Languages)

Until 2014, Cal Maritime interpreted this requirement differently, as can be seen below left (shaded in gray). This organization allowed students to elect between a course in humanities and a course in fine arts to satisfy the Area C1 requirement. This has been rectified in the current breadth designations.

2006-2013		2014	
C1	Humanities and Fine Arts	C1	Arts (Art, Dance, Music, Theatre, Film)
C2	Literature	C2	Humanities (Literature, Philosophy, Foreign Languages)
C3	Comparative Perspectives, Philosophy and Foreign Languages		

To satisfy **Area C** breadth requirements, students must complete a minimum of twelve semester units within **Area C,** with at least three units from each subset. Courses fulfilling **Area C** requirements at Cal Maritime are represented below, with a new column (shaded in pink) reflecting a proposed new minor in Maritime Culture (housed in the Department of Culture & Communication):

2006-2013		2014 (Current)		Proposed		Minor in Maritime Culture
		EGL 200: Introduction to Literature	C2	EGL 200: Introduction to Literature	C2	
EGL 210: Auto/Biography	C1			HUM 130: Intro. to Maritime Arts (new course)	C1	X
EGL 325: Creative Writing	C1	EGL 325: Creative Writing	C1	EGL 325: Creative Writing	C1	
HUM 100: Humanities Survey	C1	HUM 100: Humanities (name changed)	C2	HUM 100: Introduction to Maritime Culture (new course)	C2	X
		HUM 101: Perspectives in Culture: The Ancient World Through the Renaissance (new course)	C2	HUM 101: Perspectives in Culture: The Ancient World Through the Renaissance	C2	
		HUM 102: Perspectives in Culture: Post-Renaissance to the Present (new course)	C2	HUM 102: Perspectives in Culture: Post-Renaissance to the Present	C2	
HUM 110: World Culture Journeys	C1	HUM 110: World Culture Journeys (last taught: 20xx)	C2			
		HUM 130: Creativity (last taught 20xx)	C2			
HUM 300: Art of the Cinema	C1	HUM 300: Art of the Cinema	C2	HUM 300: Art of the Cinema	C2	
EGL 305: Twentieth-Century American Lit.	C2	EGL 305: Twentieth-Century American Lit.	C2			
EGL 310: Literature of the Sea	C2	EGL 310: U.S. Literature of the Sea (new course)	C2	EGL 310: U.S. Literature of the Sea	C2	X
		EGL 315: World Literature of the Sea (new course)	C2	EGL 315: World Literature of the Sea	C2	X
EGL 320: Literature of the Fantastic	C2	EGL 320: Literature of the Fantastic	C2			
EGL 330: Literature and Psychology	C2	EGL 330: Literature and Psychology	C2			

HUM 305: Comparative World Religions	C3	HUM 305: Comparative World Religions (last taught 20xx)	C2			
HUM 325: Globalization of Culture	C3	HUM 325: Globalization of Culture	C2	HUM 325: Globalization of Culture	C2	
		HUM 310: Engineering Ethics (new course)	C2	HUM 310: Engineering Ethics	C2	
		HUM 400: Ethics (new course)	C2	HUM 400: Ethics	C2	
LAN 110: Spanish I	C3	LAN 110: Spanish I	C2	LAN 110: Spanish I	C2	
LAN 115: Spanish II	C3	LAN 115: Spanish II	C2	LAN 115: Spanish II	C2	
LAN 120: Chinese I	C3	LAN 120: Chinese I	C2	LAN 120: Chinese I	C2	
LAN 125: Chinese II	C3	LAN 125: Chinese II	C2	LAN 125: Chinese II	C2	

Area D: Focuses on social, political and economic institutions and behavior as well as their historical background. Coursework in **Area D** highlights the fact that human social, political, and economic institutions and behaviors are inextricably interwoven. Problems and issues in these areas are examined in both contemporary and historical settings, and include both Western and non-Western contexts. Examination of topics within **Area D** must focus on the principles, methodologies, values systems and thought processes germane to a particular discipline or sub-area. The ten sub-areas falling within **Area D** are:

D1	Anthropology and Archaeology
D2	Economics
D3	Ethnic Studies
D4	Gender Studies
D5	Geography
D6	History
D7	Interdisciplinary Social or Behavioral Science
D8	Political Science, Government and Legal Institutions
D9	Psychology
D0	Sociology and Criminology

To satisfy **Area D** breadth requirements, students must complete a minimum of twelve semester units within **Area D,** with no more than three units from any one subset. Courses fulfilling **Area D** requirements at Cal Maritime:

2006-2013	2014	
		Minor in Maritime Culture

ECO 100: Macroeconomics	D2	ECO 100: Macroeconomics	D2	
ECO 101: Microeconomics	D2	ECO 101: Microeconomics	D2	
ECO 200: Economic Geography	D2or D5	ECO 200: Economic Geography	D7	
		GMA 350: Political Geography (new course)	D7	
GMA 200: Economics of Globalization	D2 or D5			
GMA 310: The Geopolitics of Energy	D2 or D5 or D8	GMA 310: The Geopolitics of Energy	D2 or D5 or D8	
		GMA 310: The Geopolitics of Energy (new course)	D5	
GMA 410: International Trade	D2 or D8			
HIS 100: U.S. History to 1877	D6	HIS 100: U.S. History to 1877	D6	
HIS 101: U.S. History from 1877	D6	HIS 101: U.S. History from 1877	D6	
HIS 210: History of Latin America	D6	HIS 210: History of Latin America	D6	
HIS 300: Maritime History of the U.S.	D6	HIS 300: Maritime History of the U.S.	D6	X
HIS 305: The World Since 1500: A Global History	D6	HIS 305: The World Since 1500: A Global History	D6	
HIS 310: A History of Technology in America	D6			
HIS 315: World Maritime History	D6	HIS 315: World Maritime History	D6	X
		HIS 316: World Maritime History II (new course)	D6	X
		HIS 350: Race, Class & Gender in the Maritime World (new course)	D6	X
		HIS 360: Bay Area Maritime History (new course)	D7	X

HUM 200: Environmental Ethics	D7			
HUM 310: Engineering Ethics	D7	HUM 310: Engineering Ethics	D7	
HUM 315: Business Ethics	D7			
HUM 320: The Sea: An Interdisciplinary Odyssey	D7			
MGT 100: Principles of Management	D7	MGT 100: Principles of Management	D7	
MGT 105: Management/Org. Behavior	D7	MGT 105: Management/Org. Behavior		
MGT 205: Organizational Behavior	D7	MGT 205: Organizational Behavior & Labor Relations (name change)	D7	
SOC 115: Intro. to Sociology	D7			
SOC 215: International Studies	D7			
GMA 320: Ocean Environmental Management	D7 or D8	GMA 320: Ocean Environmental Management	D7 or D8	
GMA 430: Maritime Security	D7 or D8			
BUS 105: Business Law	D8			
BUS 110: International Law	D8			
BUS 115: Environmental Law	D8			
BUS 315: Admiralty Law	D8			
GMA 100: Intro. to International Relations	D8	GMA 100: Intro. to International Relations	D8	
GMA 105: Ocean Politics	D8	GMA 105: Ocean Politics	D8	
		GMA 120: Introduction to Environmental Policy (new course)	D8	
GMA 205: Intro to Public Policy	D8			
		GMA 220: Comparative Maritime Policies (new course)	D8	
		GMA 225: Southeast Asia: Maritime &	D7	

		Mainland (new course)		
		GMA 230: U.S. Maritime Policy (new course)	D8	
GMA 300: U.S. Foreign Policy	D8	GMA 300: U.S. Foreign Policy	D8	
GMA 305: U.S. National Security Policy	D8			
		GMA 330: Maritime Security (new course)	D8?	
		GMA 345: Asian Security (new course)	D8?	
GMA 405: International Organization	D8	GMA 405: International Maritime Organizations (name change)	D8	
HIS 200: American Government	D8	GOV 200: American Government (designation change)	D8	
SOC 205: Intro to Psychology	D9			

Area E (Lifelong Understanding and Self-Development): Focuses on developing a greater understanding of human beings as integrated physiological, social, and psychological organisms. Courses satisfying the **Area E** breadth requirement are expected to include selective consideration of areas of inquiry, such as: human behavior, human sexuality, nutrition, health, and issues related to the human life cycle. Courses may also stress key relationships between humankind and its social and physical environment. Courses with a physical activity focus may be included under **Area E** providing they fall under topical headings referenced above.

To satisfy the **Area E** breadth requirement, students must complete a minimum of three semester units in the following list:

2006		2014	
CSL 120: Community Service Learning	E	CSL 120: Community Service Learning	E
CSL 210: Dying: The Final Stage of Living	E	CSL 210: Dying: The Final Stage of Living	E
SOC 105: Psychology of Success	E		

SOC 220: Perspectives of Leadership	E	LDR 210: Foundations of Leadership (designation and name change)	E

Framework of Course Offerings and General Education Committee Recommendations:

1. Area A: Due to its small size, Cal Maritime currently offers one course in each sub-area. Because each course serves six diverse degree areas, the curriculum is necessarily broad and somewhat generic. The development of more degree-specific courses (e.g. Technical Writing) could be explored as the campus grows, but today the Committee is satisfied that the framework of course offerings in all three sub-areas[4] is compliant with Title V.

2. Area B: Courses in sub-areas B1 (Physical Science), B3 (Laboratory Activity) and B4 (Mathematics/Quantitative Reasoning) are well-represented, but the weight of sub-Area B2 (Life Science) is carried by three courses, one of which can also count as a B1. The proposed development of a new minor in Marine Science does not currently address this, but as the campus grows, the addition of new courses which satisfy the Life Science requirement might be added. Today, the Committee is satisfied that the framework of course offerings in all four sub-Areas is compliant with Title V.

3. Area C: The framework of course offerings prior to 2014 did not comply with Title V, as it allowed students to choose to take courses in Arts instead of Humanities, or vice versa. As a result, course offerings in the Arts completely disappeared: today, there are no three-unit courses in Area C1 at Cal Maritime. By design, Cal Maritime has been out of compliance with Area C1, in all majors, for the past decade. The Committee recommends that after adopting the new framework for Area C, a course or courses in Area C1 be developed (which may require new faculty), to bring the campus into compliance with Title V. The Department of Culture & Communication will propose a minor in Maritime Culture, which not only includes a C1 course in Maritime Arts, but also attempts to provide a better organized and integrated framework for Area C2.

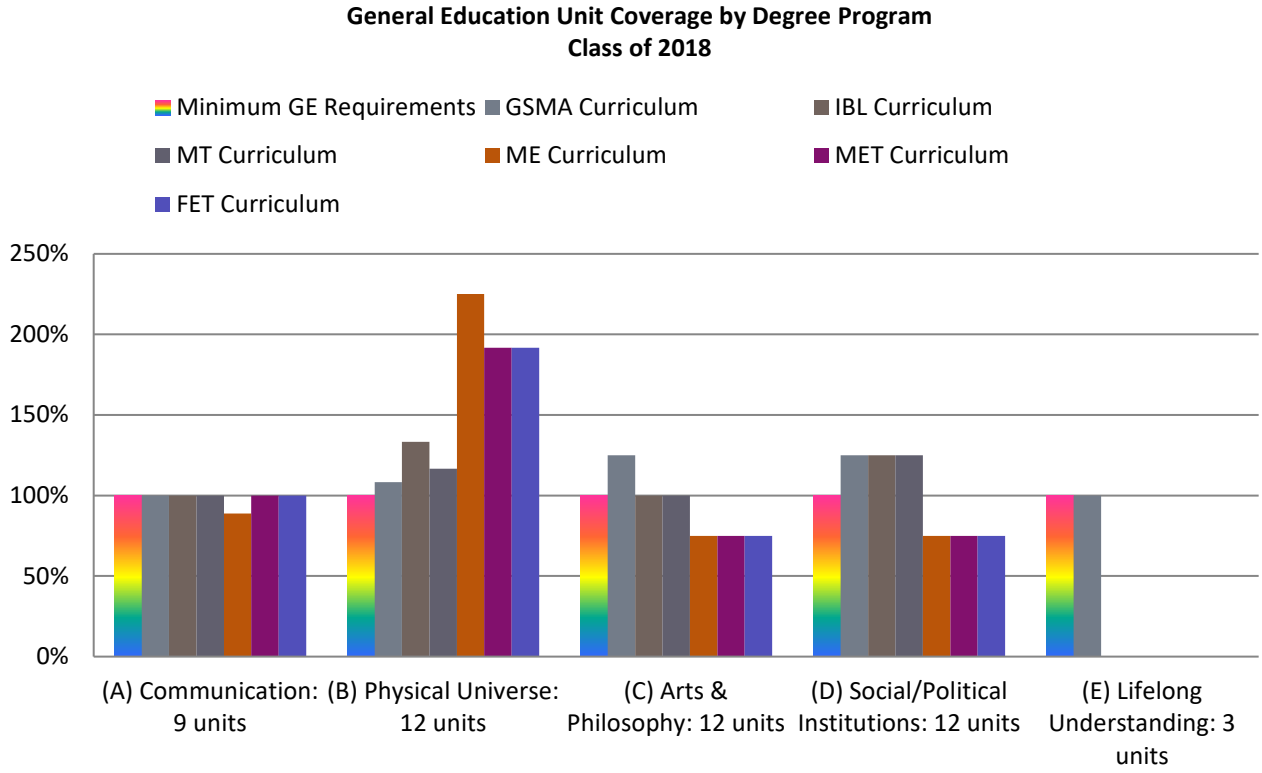
4. Area D: Area D requires more diversity within, and has the most diverse range of subject areas of all the area groups. Students must earn units in four areas of ten: prior to 2006, Cal Maritime offered courses in five of the ten areas. Currently, Cal Maritime offers courses in eight of the ten areas. The addition of HIS 350: Race, Class and Gender in the Maritime World, though classified as D7 (Interdisciplinary Social or Behavioral Science), provides material more akin to a D3 or D4 : missing are courses in D1 (Archeology and Anthropology) and currently, with the demise of SOC 205: Intro. to Sociology, D9. While breadth in Area D could certainly be strengthened (especially in the behavioral sciences), the GE Committee is satisfied with the overall framework in Area D.

5. Area E: No doubt as a direct result of broad degree non-compliance in Area E, very few courses have been developed in this area. Only GSMA students are required to comply with this Title V requirement. This is perhaps the most problematic issue in Title V at the current moment. The GE Committee recommends that this Area's framework (and course offerings) be formally reconsidered by the division of Academic Affairs at Cal Maritime.

[4] With one exception: ENG 120.

Trends Across Title V Area Requirements and General Education Committee Recommendations, 2014-15

Data used to generate the charts in this section was taken from curriculum sheets for the class of 2018. It reflects the most current curriculum planning at Cal Maritime.



General Education Review and Recommendations for Departments (Organized by Area)

Area A (Communication)

The replacement of EGL 200: Introduction to Literature with a designated critical thinking course, in 2006 resulted in almost total institutional compliance with Area A, including in the three subareas. However, Mechanical Engineering continues to use a two-unit course (ENG 120: Engineering Communications) to fulfill what should be a three-unit course in oral communication.

Committee Recommendation:

1. ME: Add one unit to ENG 120: Engineering Communication.

Area B (Physical Universe)

All degree plans contain an adequate overall number of units in Area B; however, only GSMA, IBL and MT adequately fulfill the breadth requirements. ME, MET and FET do not contain any required units in Area B2: Life Science.

Committee Recommendations:

1. ME, MET and FET: Add three units of B2 (life science) to the curriculum.
2. The MT program appears to consider its NAU 330: Meterology as a life science. This should be verified, and if appropriate, classified and assessed as such.

Area C (Arts & Philosophy)

Three out of six degree programs do not meet the minimum number of unit requirements in Area C: ME, FET and MET programs each are short three units. The remaining three programs meet the overall unit requirement, but all fail to meet the breadth requirement: Currently, no units in Area C1 (arts, dance, music, theatre or film) are required for any degree. The Culture and Communication program has not taught a three-unit course in this sub-area for at least ten years, though one-unit courses in ballroom dancing, jazz band and chorus are sporadically offered.

Committee Recommendations:

1. ME, MET and FET: Add three units of C1 (arts) to the curriculum.
2. Breadth: Develop a course in Maritime Arts, or other C1 course, and require it in place of a C2 course in IBL, GSMA and MT.

Area D (Social/Political Institutions)

Three out of six degree programs do not meet the minimum number of unit requirements in Area D: ME, FET and MET programs each are short three units. The remaining three programs meet the overall unit requirement: GSMA also meets the breadth requirement, partially due to its new required course, GMA 350: Economic Geography. IBL meets the breadth requirement if BUS 405: Leadership and Group Dynamics is taught within a psychology or sociology framework, which would classify it as a D9. MT meets the breadth requirement if it restricts its ELEC 31: Social Science Elective to courses in anthropology/archaeology (D1), ethnic studies (D3), gender studies (D4), geography (D5) interdisciplinary social or behavioral science (D7), psychology (D9) or sociology and criminology (D0).

Committee Recommendations:

1. ME, MET and FET: Add three units of Area D to the curriculum.
2. IBL: Classify BUS 405: Leadership and Group Dynamics as a D9.
3. MT: Require HIS 350: Race, Class and Gender in the Maritime World (D7) instead of a generic area D requirement.

Area E (Lifelong Understanding)

Only GSMA complies with Area E. The remaining five programs require no units in this area.

Committee Recommendations:

1. ME, MET, FET, IBL and MT: Add three units of Area E to the curriculum.
2. (Suggestion) Students in all six programs take one of the following two-unit courses: ENG 120: Engineering Communications (ME), COM 100: Introduction to Computers (MT, IBL) or LIB 100: Information Fluency

in the Digital World (GSMA, FET, MET). None of these courses meets a General Education or major course requirement, but all are required to graduate. Adding one unit to each of these courses and reframing each as an Area E: Lifelong Understanding is one possibility for bringing the five programs into compliance, and would free up three units in GSMA.

Other General Education Committee Recommendations

1. C.S.U. Title V General Education requirements are no longer listed in the Cal Maritime Course Catalog (as of the 2013-15 edition). This should be rectified.
2. Current electives are inconsistent with course descriptions in the current Catalog (p. 100-1). Further, the Committee recommends that for accuracy and better compliance, the course designation "ELEC" be reclassified by the Title V GE Area Designation.
3. Before approved, any proposed Special Topics course should identify any GE area classification it intends to hold.
4. In compiling this data, the broad classification of "humanities" or "social science" electives made it difficult, if not impossible to determine whether breadth requirements are actually being met. For this reason, the committee strongly recommends that General Education area and sub-area designations be developed for all applicable courses in the Course Catalog, and specified on Curriculum Sheets. Special attention should be paid to Area C (Arts) and Area D (Social/Political Institutions).

General Education "Report Cards," by Department

Global Studies & Maritime Affairs (GSMA)

Area	GE Requirement	Courses Fulfilling Requirements/Designation	Compliant?	Recommend-ations
A	Nine units within area A, including coursework in all three sub-areas.	EGL 110: Speech Communication (A1) EGL 100: English Composition (A2) ELEC 20: Critical Thinking Elective (EGL 220: Critical Thinking) (A3)	Yes	Remove elective status of EGL 220 on curriculum sheet
B	Twelve units within area B, including coursework in all four sub-areas.	ELEC 63: Physical Science Elective (CHE 100 or PHY 100) (B1) ELEC 62: Life Science Elective (MSC 105 or MSC 205) (B2) ELEC 63L: Physical Science Lab (B3) ELEC 70: (MTH 100: College Alg./Trig. or MTH 210 Calculus I) (B4) MTH 107: Elementary Statistics (B4)	Yes, if statistics counts as math	
C	Twelve units within area C, with at least three units from each subset.	ELEC 81: Foreign Language I (C2) ELEC 82: Foreign Language II (C2) ELEC 21: Humanities Elective (Lower Div.) (C2) HUM 325: Globalization of Culture (C2) HUM 400: Ethics (C2)	No. No units in C1 (arts, cinema, dance, music, theatre)	Replace 3 units of C2 with a C1.
D	Twelve units within area D, with no more than three units from any one subset	ECO 100: Macroeconomics (D2) ELEC 9: U.S. History (D6) HIS 300: Maritime History of the U.S. (D6) ELEC 8: American Gov. (D8) GMA 350: Political Geography (D5)	Yes	None
E	Three semester units	ELEC 45: Lifelong Understanding Elective	Yes	None

International Business & Logistics (IBL)

Area	GE Requirement	Courses Fulfilling Requirements/Designation	Compliant?	Recommend-ations
A	Nine units within area A, including coursework in all three sub-areas.	EGL 110: Speech Communication (A1) EGL 100: English Composition (A2) ELEC 20: Critical Thinking Elective (EGL 220: Critical Thinking) (A3)	Yes	Remove elective status of EGL 220 on curriculum sheet
B	Twelve units within area B, including coursework in all four sub-areas.	ELEC 63: Physical Science Elective (CHE 100 or PHY 100) (B1) ELEC 62: Life Science Elective (MSC 105 or MSC 205) (B2) ELEC 63L: Physical Science Lab (B3) MTH 100: College Alg./Trig. (B4) MTH 205: Calculus for Business (B4) MTH 107: Elementary Statistics (B4)	Yes	
C	Twelve units within area C, with at least three units from each subset.	ELEC 81: Foreign Language I (C2) ELEC 82: Foreign Language II (C2) ELEC 22: Humanities Elective (C2) HUM 400: Ethics (C2)	No. No units in C1 (arts, cinema, dance,	Replace 3 units of C2 with a C1

			music, theatre)	
D	Twelve units within area D, with no more than three units from any one subset	ECO 100: Macroeconomics (D2) ECO 101: Microeconomics (D2) ELEC 9: U.S. History (D6) ELEC 8: American Gov. (D8) BUS 405: Leadership & Group Dynamics (D9)	Yes, if BUS 405 is taught within a psychology or sociology framework (D9/DO)	Verify that the full complement of Area D requirements are met by this curriculum
E	Three semester units	None?	No	Meet this requirement

Mechanical Engineering: Third Assistant Engineer's License Option

Area	GE Requirement	Courses Fulfilling Requirements/Designation	Compliant?	Recommend-ations
A	Nine units within area A, including coursework in all three sub-areas.	ENG 120: Engineering Communications (A1) (2 units) EGL 100: English Composition (A2) ELEC 20: Critical Thinking Elective (EGL 220: Critical Thinking) (A3)	No. (A1) course is short one unit.	Add one unit to ENG 120. Remove elective status of EGL 220 on curriculum sheet
B	Twelve units within area B, including coursework in all four sub-areas.	CHE 100: Chemistry I (B1) PHY 200: Engineering Physics I (B1) PHY 205: Engineering Physics II (B1) (4 units) PHY 200L: Engineering Physics Lab (B3) CHE 100L: Chemistry Lab (B3) MTH 210: Calculus I (B4) (4 units) MTH 211: Calculus II (B4) (4 units) MTH 212: Calculus III (B4) (4 units) MTH 215: Differential Equations (B4) (4 units)	No. No life science (B2) course.	Add three units of B2.
C	Twelve units within area C, with at least three units from each subset	ELEC 21: Humanities Elective (Lower Division) (C2) ELEC 22: Humanities Elective (Upper Division) (C2) HUM 310: Engineering Ethics (C2)	No. 3 units short, and no units in Area C1	Add 3 units of C1.
D	Twelve units within area D, with no more than three units from any one subset	ELEC 8: American Institutions Elective (History) (D6) ELEC 9: American Institutions Elective (Gov't.) (D8) ELEC 31: Social Science Elective (D7)	No. 3 units short, and missing representation in subareas D1-5, D9-0.	Add 3 units in an unrepresented subarea.
E	Three semester units	None.	No. Students are not required to take any	Add 3 units of lifelong learning.

Marine Transportation

Area	GE Requirement	Courses Fulfilling Requirements/Designation	Compliant?	Recommend-ations
A	Nine units within area A, including coursework in all three sub-areas.	EGL 110: Speech Communication (A1) EGL 100: English Composition (A2) ELEC 20: Critical Thinking Elective (EGL 220: Critical Thinking) (A3)	Yes	Remove elective status of EGL 220 on curriculum sheet
B	Twelve units within area B, including coursework in all four sub-areas.	CHE 105: Introductory Chemistry (B1) PHY 100: Physics I (B1) NAU 330: Meteorology (B2) PHY 100L: Physics Lab (B3) CHE 105L: Introductory Chemistry Lab (B3) MTH 100: College Algebra/Trig. (B4)	Yes, if meteorology is a life science.	None
C	Twelve units within area C, with at least three units from each subset	ELEC 21: Humanities Elective (Lower Division) (C2) ELEC 21: Humanities Elective (Lower Division) (C2)	No. Area C2 is unrepresented	Replace one C2 with a C1

		ELEC 22: Humanities Elective (Upper Division) (C2) ELEC 400: Ethics (C2)		
D	Twelve units within area D, with no more than three units from any one subset	ECO 100: Macroeconomics (D2) ELEC 11: American Institutions Elective (History) (D6) ELEC 12: American Institutions Elective (Gov't) (D8) ELEC 31: Social Science Elective (Lower Division) (D?) LAW 315: Admiralty Law (D8)	Yes, if ELEC 31 is a D1, D3, D4, D5, D7 D9 or D0 (can't be history, goverment or economics)	Consider creating a required lower-division course for this specialized area.
E	Three semester units	None	No	Add 3 units of area E.

Facilities Engineering Technology

Area	GE Requirement	Courses Fulfilling Requirements/Designation	Compliant?	Recommend-ations
A	Nine units within area A, including coursework in all three sub-areas.	EGL 110: Speech Communication (A1) EGL 100: English Composition (A2) ELEC 20: Critical Thinking Elective (EGL 220: Critical Thinking) (A3)	Yes	Remove elective status of EGL 220 on curriculum sheet
B	Twelve units within area B, including coursework in all four sub-areas.	CHE 100: General Chemistry (B1) CHE 205: Chemistry of Plant Processes (B1) PHY 200: Engineering Physics I (B1) PHY 205: Engineering Physics II (B1) PHY 200L: Engineering Physics I Lab (B3) CHE 100L: General Chemistry Lab (B3) MTH 100: College Algebra/Trig. (B4) MTH 210: Calculus I (B4) MTH 211: Calculus II (B4)	No. No Life Science (B2) course.	Add a 3-unit B2 course.
C	Twelve units within area C, with at least three units from each subset	ELEC 21: Humanities Elective (Lower Division) (C2) HUM 310: Engineering Ethics (C2) ELEC 22: Humanities Elective (Upper Division) (C2)	No. Short 3 units, and no Arts (C1) courses.	Add three units of C1.
D	Twelve units within area D, with no more than three units from any one subset	ELEC 11: American Institutions Elective (History) (D6) ELEC 12: American Institutions Elective (Gov't) (D8) ELEC 32: Social Science Elective (Upper Division) (D?)	No. 3 units short, and no specification of subarea for ELEC 32	Add three units of D, and ensure diversity of subareas.
E	Three semester units	None	No	Add 3 units of area E.

Marine Engineering Technology

Area	GE Requirement	Courses Fulfilling Requirements/Designation	Compliant?	Recommend-ations
A	Nine units within area A, including coursework in all three sub-areas.	BUS 320: Oral Communication (A1) EGL 100: English Composition (A2) ELEC 20: Critical Thinking Elective (EGL 220: Critical Thinking) (A3)	Yes	ELEC 20: Critical Thinking Elective (EGL 220: Critical Thinking) (A3)
B	Twelve units within area B, including coursework in all four sub-areas.	CHE 110: General Chemistry (B1) PHY 200: Engineering Physics I (B1) PHY 105: Physics II (B1) PHY 200L: Engineering Physics Lab (B3) PHY 205: Engineering Physics II (B3) CHE 110L: General Chemistry Lab (B3) MTH 100: College Algebra/Trig. (B4) MTH 210: Calculus I (B4) MTH 211: Calculus II (B4)	No. No Life Science (B2) course.	Add a 3-unit B2 course.
C	Twelve units within area C, with at least	ELEC 21: Humanities Elective (Lower Division) (C2)	No. 3 units short, and no Arts (C1).	Add three units of C1.

	three units from each subset	ELEC 22: Humanities Elective (Upper Division) (C2) HUM 310: Engineering Ethics (C2)		
D	Twelve units within area D, with no more than three units from any one subset	ELEC 11: American Institutions Elective (History) (D6) ELEC 12: American Institutions Elective (Gov't) (D8) ELEC 32: Social Science Elective (Upper Division) (D?)	No. 3 units short, and no specification of subarea for ELEC 32	Add three units of D, and ensure diversity of subareas.
E	Three semester units	None	No	Add 3 units of area E.

Part IV: Appendix: Program Review, Department of Culture & Communication (Areas A and C), 2014

Co-authors:

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Completion date of the Program Review

Programs

The Department of Culture and Communications houses Cal Maritime's Writing Program, foreign language offerings, and courses that have been traditionally housed within humanities and arts departments. Not only is the program an integral component of the School of Maritime Policy and Management, it also serves the entire campus community by providing CSU depth and breadth requirements in General Education areas A, C, and E and supports the mission of Cal Maritime through its deep commitment to intellectual learning.

Department Student Learning Outcomes

From the Cal Maritime website and Course Catalog:

To be capable, enlightened citizens in today's world, students must learn to understand other cultures, whether through speaking a foreign language or studying another culture's literature, beliefs, arts, and institutions. The Student Learning Outcomes of the Culture & Communication Department are as follows:

1. Develop global awareness through learning about the cultures, ethnic groups, and languages of other peoples and civilizations, ideally, participating in these cultures directly;
2. Develop a humanized awareness, appreciating the arts and being able to discuss them intelligently; thinking critically about human institutions and their importance; learning about psychological, social, aesthetic, and cultural processes and how they are constructed; and
3. Write and speak effective, undergraduate-level prose in English, with emphasis on mechanics, organization, and the rhetorical situation
4. Use both print and online research tools necessary as appropriate support in written and oral communication

In addition to an interdisciplinary commitment to cultural awareness and communication literacies, this program also strives to instill the following habits, traits, and affective dimensions:

5. Learn independently, taking responsibility for one's educational experience; exhibit intellectual curiosity and independence, develop a commitment to lifelong learning and growth, and make judicious use of mentors, peers, and other resources where needed;
6. Develop a code of ethics that entails self-awareness, truthfulness, integrity, and service to the community, as suggested by the mission statement of this institution;.
7. Cultivate successful attitudes, such as self-confidence, self-discipline, respect for self and others, and cooperation with a group or team.
8. Commit to critical and creative thinking and expression, and be able to apply these skills flexibly to new situations

In 2008, these program-level student learning outcomes were created to support the Institution-wide Student Learning Outcomes and organize and focus the learning outcomes across the Culture and Communication course offerings:

Coverage Map of Program-Level Student Learning Outcomes

to Institution-wide Student Learning Outcomes, 2014

Institution-Wide Student Learning Outcomes	A. Communication	B. Critical & Creative Thinking	C. Quantitative Reasoning	D. Scientific Reasoning	E .Lifelong Learning	F. Discipline-Specific Knowledge	G. Information Fluency	H. Leadership & Teamwork	I. Ethical Awareness	J. Global Stewardship
Program-Level Outcomes										
1. Develop global awareness through learning about the cultures, ethnic groups and languages of other peoples and civilizations.										■
2. Develop a "humanized" awareness, appreciating the arts and being able to discuss them intelligently; thinking critically about human institutions and their importance; learning about psychological, social, aesthetic and cultural processes and how they are constructed.		■							■	
3. Write and speak effective undergraduate-level prose in English with emphasis on mechanics, organization and the rhetorical situation	■									
4. Use both print and online research tools necessary as appropriate support in written and oral communication.	■						■			
5. Learn independently, taking responsibility for one's educational experience; exhibit intellectual curiosity; develop a commitment to lifelong learning & growth, and make judicious use of mentors, peers and other resources where needed.		■			■			■		
6. Develop a code of ethics that entails self-awareness, truthfulness, integrity and service to the community, as suggested by the mission statement of this institution.								■	■	■
7. Cultivate successful attitudes, such as self-confidence, self-discipline, respect for self and others, and cooperation with a group or team.								■		
8. Commit to critical and creative thinking and expression, and be able to apply these skills flexibly to new situations.		■								

Coverage Map of Courses Containing Outcomes to Program-Level Student Learning Outcomes, 2014

	1. Develop global awareness...	2. Develop a "humanized" awareness...	3. Write and speak effectively...	4. Use both print and online research tools...	5. Learn independently...	6. Develop a code of ethics...	7. Cultivate successful attitudes, ...	8. Commit to critical and creative thinking....
EGL 100. English Composition			■	■				
EGL 110: Speech Communication			■	■	■	■	■	■
EGL 200: Introduction to Literature		■		■				■
EGL 220: Critical Thinking		■	■	■	■			■
EGL 300: Advanced Writing			■	■				
EGL 305: 20TH Century American Literature		■		■				■
EGL 310: Literature of the Sea		■		■				
EGL 320: Literature of the Fantastic		■		■				
EGL 325: Creative Writing	■	■						■
EGL 330: Literature and Psychology	■	■		■				■
HUM 100: Humanities				■				
HUM 101: Perspectives in Culture I	■			■				
HUM 102: Perspectives in Culture II	■			■				
HUM 110: World Culture Journeys	■			■			■	
HUM 130: Creativity		■		■	■			
HUM 300: Art of the Cinema		■		■				
HUM 305: Comparative World Religions	■			■				
HUM 325: Globalization of Culture	■			■				
HUM 400: Ethics		■		■		■		
LAN 110: Spanish I	■							
LAN 115: Spanish II	■						■	
LAN 120: Chinese I	■						■	
LAN 125: Chinese II	■							
CSL 120: Community Service Learning				■	■		■	
CSL 210: Dying: The Final Stage of Living				■	■			

Assessment Efforts, to Date

As the Culture & Communication Department has only held departmental status for one year, assessment of its learning outcomes has not yet occurred. However, since 2010, the Institution-wide Assessment Council has been steadily assessing its Institution-wide Student Learning Outcomes which conveniently cover almost every aspect of the Culture & Communication curriculum:

Program-Level Student Learning Outcome	**Corresponding Institution-Wide Assessment Efforts[5]**
1. Develop global awareness through learning about the cultures, ethnic groups and languages of other peoples and civilizations.	Global Stewardship Report, 2011
2. Develop a "humanized" awareness, appreciating the arts and being able to discuss them intelligently; thinking critically about human institutions and their importance; learning about psychological, social, aesthetic and cultural processes and how they are constructed.	*Not an institution-wide student learning outcome*
3. Write and speak effective undergraduate-level prose in English with emphasis on mechanics, organization and the rhetorical situation	Written Communication Report, 2010
4. Use both print and online research tools necessary as appropriate support in written and oral communication.	Information Fluency Report, 2013
5. Learn independently, taking responsibility for one's educational experience; exhibit intellectual curiosity; develop a commitment to lifelong learning & growth, and make judicious use of mentors, peers and other resources where needed.	Lifelong Learning Report, 2013
6. Develop a code of ethics that entails self-awareness, truthfulness, integrity and service to the community, as suggested by the mission statement of this institution.	Ethical Awareness Report, 2013
7. Cultivate successful attitudes, such as self-confidence, self-discipline, respect for self and others, and cooperation with a group or team.	Leadership and Teamwork (expected 2015)
8. Commit to critical and creative thinking and expression, and be able to apply these skills flexibly to new situations.	Critical and Creative Thinking Report, 2011

IWAC Assessment Tools, Results and Recommendations

Data from these reports was collected, assessed and presented in various, sometimes incompatible formats, making it difficult to perform a quantitative snapshot-style cross-section of results.[6]

1. Develop global awareness through learning about the cultures, ethnic groups and languages of other peoples and civilizations.

In the Academic Year 2010-2011 IWAC conducted an assessment of the institution-wide student learning objective, Global Stewardship. A 2-question rubric was e-mailed to faculty with the request that they apply it to one of their assignment each semester in at least one course and record the results on an Excel
Spreadsheet. The participation was low. Though 22 classes participated and 428 samples were collected, all the courses were from the ABS school.

Results:

[5] Please see the Assessment Portal on the Cal Maritime website for these reports.
[6] The Committee recommends that a common, or at least compatible, methodology be employed in future IWAC assessment..

1. The aggregated data for both measures of Global Stewardship (knowledge and responsibilities) met the benchmark that 70% of student work score 4 or higher.
2. BUS, EGL, GOV, HUM, MGT data for both measures of Global Stewardship (knowledge and responsibilities) met the benchmark that 70% of student work score 4 or higher.
3. GMA data for Global Stewardship responsibilities met the benchmark that 70% of student work score 4 or higher.
4. GMA data for Global Stewardship knowledge did not meet the benchmark that 70% of student work score 4 or higher.
5. ECO data for Global Stewardship knowledge and responsibilities did not met the benchmark that 70% of student work score 4 or higher.
6. On both measures, the majority of students work earned a 4 (satisfactory) or 5 (exemplary).
7. On both measures, upper-division students outperformed lower-division students.

Recommendations:

1. The IWAC believes that disciplines not meeting the 70% benchmark have conversations about how to raise their scores and/or increase participation.
2. The IWAC recommends that instructors from more programs (as many as are relevant to this outcome) participate in the data gathering (2014-2015) and the analysis of recommendation (2011-2012) and the report on changes (2012-2013).

2. Develop a "humanized" awareness, appreciating the arts and being able to discuss them intelligently; thinking critically about human institutions and their importance; learning about psychological, social, aesthetic and cultural processes and how they are constructed.
Results: None

3. Write and speak effective undergraduate-level prose in English with emphasis on mechanics, organization and the rhetorical situation.

In 2010, the faculty of the Writing Program, in conjunction with the Institution-Wide Assessment Council, set out to measure written communication through a variety of assessment instruments, including Graduate Writing Exam data, cross-disciplinary and campus wide surveys, and data collection for multiple types of student writing. The following results represent a multi-faceted, aggregated and disaggregated analysis of student performance in written communication.

Results: Were Standards Met?

1. Student Writing Samples: Yes: Writing standards were met by students of all majors and levels in the areas of "content" and "organization," with scores no lower than a "four" out of a possible "five." No: Standards were nearly, but not quite met in the area of "mechanics," with an averaged score of 3.79 out of a possible "five."
2. Faculty Attitudes Survey: Yes: 89% of seniors were ranked "adequately" or "well-prepared" for writing on the job. No: faculty were satisfied with seniors' abilities in eight of sixteen skill sets. The remaining eight (skill sets in mechanics/utilizing and documenting external sources) ranked between "somewhat satisfied" and "somewhat dissatisfied."
3. Comparison of Student Test Scores With Demographic Data: No: Technical fields are much less likely to pass the Graduate Writing Exam than non-technical fields.

Recommendations:

1. Review of current assessment tools and standards for success.
2. Correlation of the 2010-11 Collegiate Learning Assessment (CLA) data (forthcoming) with current faculty perceptions of student achievement.
3. Development and implementation of a cross-disciplinary faculty poll, clarifying/determining:
    a. Which, if any, documentation style is preferred in student research papers?

   b. Which aspects of integrating and citing source material are especially problematic for students?
4. More specific assessment of writing mechanics issues on the lower-division level, across the Culture & Communication program, and implementation of changes in relevant course(s).
5. Development of a plan for improving GWE pass rates for more technical majors.

4. Use both print and online research tools necessary as appropriate support in written and oral communication.

In the Academic Year 2012-2013, IWAC conducted an assessment of the institution-wide student learning outcome, Information Fluency. It was decided to assess using artifacts from four courses: GMA 401: Senior Seminar II Research Project; HUM 310: Engineering Ethics; NAU 400: Advanced Maritime Topics; and BUS 301: International Business II Country Research Analysis and Global Marketing. All these courses have a significant research-based assignment, and all majors on campus are required to take one of these courses. Thus, IWAC was able to capture a significant proportion of upperclassmen by targeting these courses. All but one of these courses are taken by a single major predominantly, and thus assessment results for a particular class approximate outcomes for the corresponding program. The exception is HUM310, which is part of the curriculum for three majors: Mechanical Engineering, Marine Engineering Technology, and Facilities Engineering Technology. The capstone projects for the graduate MSTEM program were also assessed during this period.

A 2-question rubric was drafted by IWAC and shared with all Cal Maritime faculty in fall 2012. Faculty were surveyed in spring 2013 regarding their satisfaction with students' levels of information fluency. In summer 2013, IWAC members used the rubric to score research papers from the five courses listed above. IWAC scored 100% of papers from GMA 401, NAU 400, and BUS 301, and scored an approximately 50% data sample from HUM 310 and the MSTEM capstone. The data sample thus included 15 artifacts for GMA 401, 21 for NAU 400, 20 for BUS301, 30 for HUM 310, and 11 for MSTEM. The data generated the following findings:

Results:

1. The aggregated data for both measures of Information Fluency (Location/Evaluation of Sources and Attribution of Sources) indicates that CMA did not meet the benchmark of 70% of undergraduate student work scoring 4 or higher on the rubric (rubric scores range 1-6).
2. Disaggregated by course, only students in GMA401 met the benchmark that 70% of student work score 4 or higher for one measure, Location/Evaluation of Sources. No course met the benchmark that 70% of student work score 4 or higher for Attribution, though GMA401 scored highest with 50% scoring 4 or higher.
3. Overall mean rubric scores, collapsing both measures and disaggregating by undergraduate major, were GSMA 3.14; MET 2.94; ME 2.58; MT 2.02; IBL 1.65.
4. MSTEM capstone projects did not meet the benchmark of 70% of graduate student work scoring 5 or higher on the rubric. Mean overall score was 3.50.

Interpretation of the Results:

1. Higher assessment scores in the GSMA program may be attributable to a) a required 2-unit Information Fluency course in the GSMA curriculum, as well as b) additional research-based writing required in this major. The MET/FET program is the only other program at Cal Maritime which requires the Information Fluency course, and full disaggregated data for this program was not available, so the impact of the credit-based course is inconclusive. But the higher mean score of MET majors compared to ME majors in the same course (HUM 301) suggests taking a credit-based course has some impact on this learning outcome for engineers. This difference in information fluency rubric scores of HUM301 papers has been seen in two previous years of program assessment.
2. For those programs without a credit-based information fluency requirement (IBL, ME, MT), the current model of curriculum-integrated instruction does not appear to be sufficient in achieving the desired learning outcome.

Recommendations:

1. The IWAC recommends the MPM department consider the addition of credit-based information fluency coursework for the IBL major. A one-unit co-curricular course or courses, in which information fluency instruction is combined with discipline-specific content, has been recommended by the Information Fluency Program Coordinator and discussed by the MPM department.
2. For all programs, the IWAC recommends the Information Fluency Program focus additional efforts on providing resources and development opportunities to faculty, particularly related to research assignment design and assessment.
3. 3. Regarding low scores on attribution across all programs, IWAC recommends exploring the adoption of a single citation style across campus.

5. Learn independently, taking responsibility for one's educational experience; exhibit intellectual curiosity; develop a commitment to lifelong learning & growth, and make judicious use of mentors, peers and other resources where needed.

In the Academic Year 2012-2013 IWAC conducted an assessment of the institution-wide student learning objective , Lifelong Learning. In the first year of the assessment calendar, a survey was submitted to all faculty asking for their input regarding the definition of lifelong learning and how it may be practiced and studies. In an initial meeting, the IWAC Committee decided that since lifelong learning was a very ambiguous and thorny concept to assess, we would use survey instruments. Also, since lifelong learning by its very nature requires an assessment of work beyond and outside the academy, we sought to gather information from outgoing senior students and alumni. Three surveys were eventually drafted and used: a survey to senior students, a survey to faculty, and a survey to alumni. With no previous benchmarks or expectations, it was hoped that survey questions where a positive answer ("agree strongly" or "agree somewhat" would be selected by 75% of the respondents The data generated the following findings:

Results:

1. For the survey of graduating seniors, the benchmark was not reached on all questions. When asked to respond to the statement" "my experience at Cal maritime helped foster my desire for lifelong learning," on 59.61% responded in the affirmative. When asked "While taking a class, I seek out learning experiences beyond those required," 73.08% responded in the affirmative. When asked "I seek out enrichment or learning experiences during travel, only 32.76% responded in the affirmative.
2. For the survey to alumni, the benchmarks were met.
3. For the survey to faculty, the benchmarks were met.

Interpretation of the Results:

1. As the first effort at assessing lifelong learning, there may be some issues with how we interpret this data. Certainly it appears alumni are interested in, and participate in, activities that fall under the rubric of lifelong learning. Curiously, students currently enrolled do not share this view. Perhaps over time, a recognition of the merit of continued learning begins to form.

Recommendations:

1. For the next cycle, IWAC recommends that the definition and understanding of the concept of lifelong learning be better understood before development assessment tools.
2. For the next cycle, IWAC recommends creating assessment tools (with accompanying benchmarks) that are easier to measure and which may provide more useful measurements.

6. Develop a code of ethics that entails self-awareness, truthfulness, integrity and service to the community, as suggested by the mission statement of this institution.

In the Academic Year 2012-2013 IWAC conducted an assessment of the institution-wide student learning objective , Ethical Awareness and Ethical Reasoning. In the first year of the assessment calendar, a survey was submitted to all faculty asking for their input on the importance of teaching ethics. This survey also sought to determine which courses had an element of ethical reasoning. It was ultimately decided to assess two courses: HUM 310: Engineering Ethics, and HUM 400: Ethics. Both of these courses have an obvious commitment to instruction in ethical reasoning, and all majors on campus are required to take one or the other of these courses. Thus, IWAC was able to capture nearly all potential graduates by targeting these courses. A 2-question rubric was drafted by IWAC and approved by the instructors of the ethics course. IWAC members scored the rubrics using term papers from HUM 310 and midterm examinations from HUM 400. IWAC used an approximately 50% data sample, which meant 33 artifacts for HUM 400 and 30 for HUM 310. The data generated the following findings:

Results:

1. The aggregated data for both measures of Ethics (Awareness and Reasoning) indicates that CMA did not meet the benchmark of 70% of student work scoring 4 or higher on the rubric.
2. Disaggregated by major, no department met the benchmark that 70% of student work score 4 or higher.
3. Those in HUM 310 (Engineering Ethics) fared better than those in HUM 400 (Ethics).
4. When analyzed by gender and expected graduation year, no exceptional statistics were noticed compared to the general population.

Interpretation of the Results:

1. The IWAC believes that the low scores are not a true indication that our students are not performing at acceptable levels. Rather, IWAC believes that the rubric used (which was revised from the American Association of Colleges and Universities' VALUE rubrics in use across the country) did not lend itself well to the artifacts collected. There was some incompatibility between the standardized rubric and the material collected to be assessed.

Recommendations:

1. IWAC recommends that in the future, a closer relationship be established between IWAC members responsible for generating the rubric and those instructors whose courses are being assessed. IWAC believes stronger results will be achieved through a closer connection between rubric and artifact.

2. IWAC also recommends a campus conversation on the relationship between professional ethics courses and "generic" ethics courses. To what extent do these (or should these) courses share learning outcomes? What is being taught differently in these courses, and what should be shared?

7. Cultivate successful attitudes, such as self-confidence, self-discipline, respect for self and others, and cooperation with a group or team.
Results: Expected in 2015

8. Commit to critical and creative thinking and expression, and be able to apply these skills flexibly to new situations.

In 2011 IWAC conducted an assessment of Critical and Creative Thinking, in which faculty chose a random sample of student work, such that at least 1/3 of the class or 10 samples (whichever is most) were provided. Faculty then used the rubric for "Creativity and Critical Thinking" and applied it to the samples. Finally, faculty filled out and submitted Excel charts of the data for each class, which were inputted into a database and analyzed.

Results:

The program achieved its standards for success: 70%+ of students scored a "four" out of "six" in creativity and 78%+ in critical thinking. The benchmark was 70%.

Recommendations:

1. The campus needs to put more effort into creativity, as only general education (plus 1 ME class) courses participated in this assessment.

2. Many course designations include many majors, but the results were not disaggregated by major. Disaggregating by majors may show us whether trends hold across courses.

CSU General Education Breadth Requirements

The majority of courses in the Department of Culture & Communication are taught in the context of **Area A (Communication in the English Language & Critical Thinking) and C (Arts, Literature, Philosophy & Foreign Languages)** of the CSU General Education breadth requirements (Executive Order 1065, September 16, 2011).
All CSU baccalaureate degrees must contain a minimum of 9 semester units in **Area A** – with three units in each of subareas A1, A2 and A3:

- **A1: Oral Communication:** Courses must include faculty-supervised, faculty-evaluated practice in communicating orally *in the physical presence of other listeners*. Rhetorical principles must be covered (study of effective communication in formal speeches or social interaction is appropriate,for example).[7]

- **A2: Written Communication:** According to the CSU Chancellor's Office, this course "emphasize[s] development of students' communication and reasoning skills. [This requires] coursework in "communication in the English language, to include both oral communication and written communication," making them the only areas in the GE patterns that must be taught in English.[8]

- **A3: Critical Thinking:** Critical thinking courses include explicit instruction and practice in inductive and deductive reasoning and identification of formal and informal fallacies of language and thought. Literary criticism courses are typically not accepted in this area.[9]

Each of the six baccalaureate degrees offered at Cal Maritime meet the CSU General Education Area A requirements in the following way:

A1: EGL 100: Oral Communication
A2: EGL 110: Introduction to Composition
A3: EGL 220: Critical Thinking

All CSU baccalaureate degrees must contain a minimum of 12 semester units in **Area C** – with three units from each subareas C1 and C2:

- **C1: Arts (Visual Arts, Dance, Music, Theatre):**
  Arts include:
  ⇒ visual arts
  ⇒ architecture
  ⇒ interior design
  ⇒ music
  ⇒ dance
  ⇒ theater

[7] ibid
[8] Guiding Notes for CSU General Education Course Reviewers, Fall 2006 (revised 2012)
[9] ibid

⇒ film
Studio and performance classes that develop technique or skills alone don't meet the standards established for this area. For C1 in the CSU's GE-Breadth pattern courses must also address aesthetic and cultural study.[10]

- C2: Humanities (Literature, Philosophy & Foreign Language): Executive Order 595 states: "Students should be motivated to cultivate and refine their affective as well as cognitive and physical faculties through studying great works of the human imagination...." Also, "For Area C, courses emphasize the perspectives, concepts, principles, theories and methodologies of the disciplines. Some application of principles and development of skills are acceptable as long as the foundational principles, concepts, theory and perceptions underlying scholarship are strong components."[11]

Department Programs

The department does not offer a degree or major. but organizes its course offerings under two headings: Culture and Communication.

Program in Communication

The courses in the **Communication** program are:

- EGL 100: Introduction to Composition (3 units):
- EGL 110: Oral Communication:
- EGL 220: Critical Thinking:
- EGL 300: Advanced Writing[i]
- ENG 120: Engineering Communication

ENG 120 is a graduation requirement for ME majors.
Until 2011, BUS 200 was a graduation requirement for IBL students.

EGL x is a required course for [x] majors.

Student Learning Outcomes, Communication Program (SLO)

The Communication Program reinforces the following SLOs:

3. Write effective, undergraduate-level prose in English, with emphasis on mechanics, organization, and the rhetorical situation

4. Use the technological and research tools necessary as appropriate support in written and oral communication and understand the conventions and significance of appropriate documentation guidelines.

8. Commit to critical and creative thinking and expression, and be able to apply these skills flexibly to new situations

[10] ibid
[11] Guiding Notes, 2006 version.

Communication Educational Objectives

The specific educational objectives expected of students upon successful completion of communication courses currently offered at Cal Maritime follow:

Assessment Plan: Past

Before 2012, the Culture & Communication Department did not exist; instead, the university relied on Institution-wide Student Learning Outcome (IW-SLO) assessment as the only tool to measure the CSU's General Education Area A Breadth Requirement: Communication in the English Language. In 2009-2010, composition faculty set out to measure A1 (written communication) through a variety of assessment instruments, including Graduate Writing Exam data, cross-disciplinary and campus-wide surveys, and data collection for varying types of student writing[12]. Likewise, Area A2 (critical thinking) was measured in the same fashion in 2011[13].

Assessment of Program's Objectives and Outcomes: Future

While these reports painted a picture of student achievement in broad strokes, it did not address the area A IW-SLOs in full. For example, oral communication was not measured. Life-long learning was not assessed. Technology skills were not assessed. Only a more focused, program-level assessment tool could measure these narrower objectives, and thus, the new department has created a new rubric to this end.

The rubric and assessment criteria that follow were created by the Communication Program in 20xx to assess the PSLOs. Mapping to the Institution-wide Student Learning Outcomes (IW-SLO) is included (see appendix for a list of Institution-wide Student Learning Outcomes.

	Poor (1)	Acceptable (3)	Excellent (5)
PSLO 3: Write and speak effective, undergraduate-level prose in English, with emphasis on mechanics, organization, and the rhetorical situation IW-SLO: A			
PSLO 2: Use the technological and research tools necessary as appropriate support in written and oral communication and understand the conventions and significance of appropriate documentation guidelines IW-SLO: A, G			

[12] See appendix for this report.
[13] See appendix for this report.

PSLO 8: Commit to critical and creative thinking and expression, and be able to apply these skills flexibly to new situations IW-SLO: B			

Trends in the Curriculum Development

Currently, all courses in Culture and Communication are General Education and service courses because Cal Maritime does not offer a Major or Minor in Composition, Oral Communication, or Rhetoric. The courses offered are, save Advanced Writing, lower-division, introductory courses. The contents of each course are such that they meet the transferability requirements established by the California State University (CSU) system, so opportunities for faculty to develop new trends and course offerings are lacking.

Content of the Curriculum

The communication student learning outcomes and educational objectives are aligned with the content of the curriculum and, within the extent of its contents, the curriculum prepares students for the courses that they need to take later in their majors. Nevertheless, there are serious gaps in the content of the curriculum and depth to which content is covered, which are critical to the students' general education and crucial for preparing students for their fields of study. In particular, ENG 100: Introduction to Composition attempts to serve all majors despite the great disparity in writing requirements and writing genres between licensed and non-licensed majors .

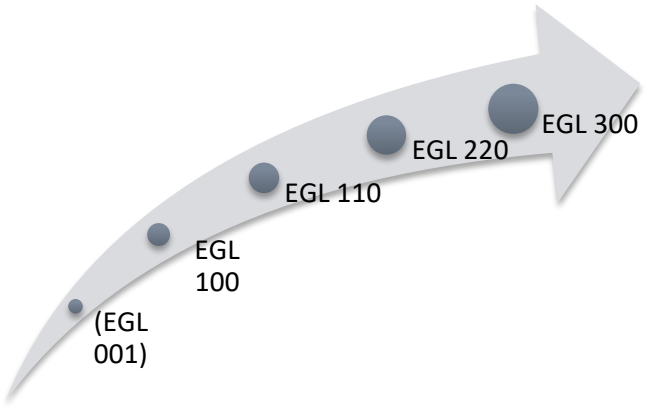


Figure 1. Organization of the Communication Curriculum

Curriculum Review Process

Curriculum matters are presented to the Curriculum Committee and are reviewed by the Committee members upon request.

Curriculum Changes

No Communication courses have been added, deleted or modified over the past five years, with the exception of BUS 220: Business Communication being deleted from the IBL curriculum and replaced with EGL 110: Oral Communication. This change was made in order to more completely satisfy the GE requirement in oral communication (A1).

Students at Cal Maritime would greatly benefit from the addition of another semester of composition: whether it be a lower-division extension of EGL 100 or an upper-division course in discipline-specific writing (supplementing the senior thesis requirement for GSMA students, the cruise reports for MT students, or the design project requirement for ME students). Pressure from the CSU to limit baccalaureate units to 120, however, has kept this initiative permanently on the back-burner.

Writing Remediation

Like all other CSU campuses, the Academy has a number of incoming students who need remediation in writing. The trend over the past six years has shown that fewer incoming students need math remediation (Appendix I), which indicates that the present incoming students are better prepared, in terms of math skills, than past incoming students.[14]

Year	Total Number of Incoming Students	Number (%) Needing Remediation in Writing

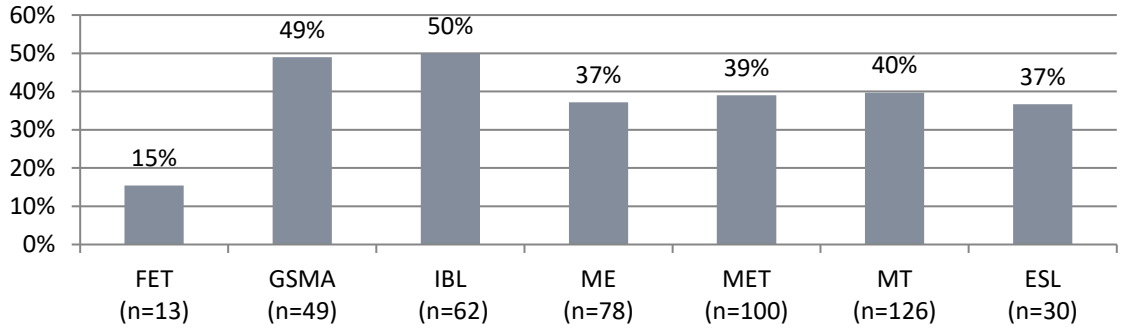
Whereas other CSU campuses offer many sections of writing remediation at multiple levels (Developmental English, English for non-native speakers "stretch" courses), we only offers one level of remedial writing (EGL 001 Introduction to Composition), and in recent years, only one section of EGL 001 has been offered each semester. Before the fall 2005, EGL 001 was offered through the regular schedule of classes during the fall semesters. Between fall of 2005 and fall of 2012, EGL 001 was not offered through the regular schedule of classes; it was offered through the Academy's Office of Sponsored Projects and Extended Learning (SPEL). Students needing to enroll in EGL 001 through SPEL paid an extra fee for the class and took the course during the evening hours or late afternoons along with their regularly scheduled classes in the fall.

Graduate Writing Assessment Requirement

The Graduation Writing Assessment Requirement (GWAR) requires that all CSU students demonstrate competence in written communication before they are granted a baccalaureate degree. At Cal Maritime, all students who have achieved junior standing and have completed EGL 100 English Composition and at least 60 units of academic coursework must either take EGL 300 Advanced Writing or challenge said course by successfully completing the Graduate Writing Examination (GWE). Students who pass the GWE will receive credit for EGL 300.
The GWE may be attempted twice, but students who fail a second time must take EGL 300. The class and the exam are offered every semester. Students who sit for the GWE will be charged a fee.
According to the Chancellor's Office (Executive Order 665), "Students shall be matriculated at the CSU campus where they satisfy the Graduation Writing Assessment Requirement (GWAR)." (1997, p. 4) Unless a student has previously met this requirement at another CSU campus before transferring to Cal Maritime, he or she must satisfy the GWAR at Cal Maritime.

Students taking the GWE read a passage–roughly 600 to 800 words–and use the reading as a basis for their written commentary. Students are expected to answer a question (or questions) in a 700-word essay which speaks to clarity, quality of thought, mechanics and completeness, as well as unity and development of concepts. Students have three (3) hours in which to complete the handwritten exam and are allowed to use dictionaries and thesauri. Non-native English speakers and students with documented disabilities will receive special accommodation, upon request.

Graduate Writing Exam Pass Rates, by Major (and ESL)
2008-2013



Curriculum Comparison

As previously mentioned in the "Content of the Curriculum" section above, the Communication courses offered at Cal Maritime are very limited in comparison to other CSU campuses. In principle, courses in the Communication program are designed to meet the transferability requirements established by the CSU system.

Culture Program[15]

Courses in the **Culture** program can be divided into six areas: Community Service Learning, Literature, Humanities, Ethics, Foreign Languages and Performing Arts:

Community Service Learning

CSL 120: Community Service Learning
CSL 185: Study Abroad Elective
CSL 210: Dying: The Final Stage of Living

Literature

EGL 200: Introduction to Literature
EGL 305: Twentieth-Century American Literature
EGL 310: U.S. Literature of the Sea
EGL 315: World Literature of the Sea
EGL 320: Literature of the Fantastic
EGL 325: Creative Writing
EGL 330: Literature and Psychology

[15] Make sure to mention the fact that ethics is a graduation requirement AND a GE course.

Humanities

HUM 100. Humanities
HUM 101. Perspectives in Culture: The Ancient World Through the Renaissance
HUM 102. Perspectives in Culture: Post-Renaissance to the Present
HUM 110. World Culture Journeys
HUM 130. Creativity
HUM 185. Study Abroad Elective
HUM 300. Art of the Cinema
HUM 305. Comparative World Religions
HUM 325. Globalization of Culture

Ethics

HUM 400: Ethics

Foreign Languages

LAN 110: Spanish I
LAN 115: Spanish II
LAN 120: Chinese I
LAN 125: Chinese II

Performing Arts
PA 395: Special Topics

Program in Culture Student Learning Outcomes (PSLO)

The Culture Program at Cal Maritime reinforces the following PSLOs:

1. Develop global awareness through learning about the cultures, ethnic groups, and languages of other peoples and civilizations

2. Develop a "humanized" awareness, appreciating the arts and being able to discuss them intelligently; thinking critically about human institutions and their importance; learning about psychological, social, aesthetic, and cultural processes and how they are constructed

5. Learn independently, taking responsibility for one's educational experience, exhibit intellectual curiosity and independence, develop a commitment to lifelong learning and growth, and make judicious use of mentors, peers, and other resources where needed

6. Develop a code of ethics that incorporates self-awareness, truthfulness, integrity, and service to the community, as suggested by the mission statement of this institution

7. Cultivate successful attitudes, such as self-confidence, self-discipline, respect for self and others, and cooperation with a group or team.

Assessment of Program's Objectives and Outcomes

The following rubrics and assessment criteria that follow were created by the Culture Program to assess the PSLO. Mapping to the Institution-wide Student Learning Outcomes (IW-SLO) is included.

For Community Service Learning Courses:

	Poor (1)	Acceptable (3)	Excellent (5)
PSLO 5: Learn independently, taking responsibility for one's educational experience, exhibit intellectual curiosity and independence, develop a commitment to lifelong learning and growth, and make judicious use of mentors, teamwork, and other resources where needed IW-SLO: B, E, H			
PSLO 7: Cultivate successful attitudes, such as self-confidence, self-discipline, respect for self and others, and cooperation with a group or team IW-SLO: H			

For Literature and Humanities Courses:

	Poor (1)	Acceptable (3)	Excellent (5)
PSLO 1: Develop global awareness through learning about the cultures, ethnic groups, and languages of other peoples and civilizations IW-SLO: J			
PSLO 2:			

Develop a "humanized" awareness, appreciating the arts and being able to discuss them intelligently; thinking critically about human institutions and their importance; learning about psychological, social, aesthetic, and cultural processes and how they are constructed IW-SLO: B, I			

For Ethics Courses:

	Poor (1)	Acceptable (3)	Excellent (5)
PSLO 6: Develop a code of ethics that incorporates self-awareness, truthfulness, integrity, and service to the community, as suggested by the mission statement of this institution IW-SLO: I			

For Performing Arts Courses:

	Poor (1)	Acceptable (3)	Excellent (5)
PSLO 1: Develop global awareness through learning about the cultures, ethnic groups, and languages of other peoples and civilizations, ideally, participating in these cultures directly IW-SLO: J			
PSLO 2: Develop a "humanized" awareness, appreciating the arts and being able to discuss them intelligently; thinking critically about			

human institutions and their importance; learning about psychological, social, aesthetic, and cultural processes and how they are constructed IW-SLO: B, I			

For Foreign Language Courses:

	Poor (1)	Acceptable (3)	Excellent (5)
PSLO 1: Develop global awareness through learning about the cultures, ethnic groups, and languages of other peoples and civilizations IW-SLO: J			

Trends in the Curriculum Development

Currently, all Culture courses taught are General Education and service courses because Cal Maritime does not yet offer a major or a minor in Culture; however, a minor in Maritime Culture is planned. Offering a minor in Maritime Culture would help meet one of the important goals of Cal Maritime's Academic Master Plan, which is to develop academic minors to offer students opportunities beyond their major course of study (Goal AP-3). The contents of each course are such that they meet the transferability requirements established by the California State University (CSU) system, so opportunities for faculty to develop new trends and course offerings are lacking.

In order for students to minor in Maritime Culture at Cal Maritime, only a few additional courses would need to be offered. An outline of course requirements for a minor in Maritime Culture comparable to minors in specialized humanities offered at other CSU campuses follows.

Minor in Maritime Culture (Proposed 2014)

In addition to the general requirements for earning a minor at Cal Maritime, and to receive a transcript notation of having completed the specific requirements for a minor in Maritime Culture, the student will have completed a minimum of 18 units from the following curriculum:

All students must complete the following courses:

HUM 100: Introduction to Maritime Culture (C2)
HUM 130: Introduction to Maritime Arts (new course) (C1)
EGL 310: U.S. Literature of the Sea (C2)
EGL 315: World Maritime Literature (C2)
HIS 300: Maritime History of the U.S. (D6)
HIS 316: World Maritime History (D6)
HIS 350: Race, Class & Gender in the Maritime World (D2, D3 or D7)

The Cal Maritime Ocean Initiative (CMOI)

Faculty from the Departments of Culture & Communication and Sciences & Mathematics launched the Cal Maritime Ocean Initiative during summer 2014 with the goal of improving ocean literacy (OL) on campus and to establish Cal Maritime as the leader in OL education among the US Maritime Colleges. A lack of OL among the American public has been identified by the Pew Ocean Commission and the US Congressional Ocean Commission as a major impediment to the establishment of a comprehensive national ocean policy. The National Science Foundation was directed to provide definitions of OL and guidance for curricula in support of expansion of OL among the US electorate.

The NSF defines ocean literacy according to seven principles of basic ocean science. Whether through scientific, historical, ethical or cultural knowledge we seek to promote the understanding of the ocean as part of Cal Maritime's core identity and provide students with an awareness of their roles and responsibilities in the maritime world. We believe that with the vision of training the future leaders of the Pacific maritime industry, Cal Maritime has an opportunity – and obligation -- to take a leadership role in OL education among the US maritime colleges as well as the broader higher education community.

During the fall semester 2014, all Cal Maritime Freshmen have been invited to participate in a brief survey designed to assess student content knowledge and attitudes and perceptions about the ocean. This survey is available through the online portal Formstack; to date more than 80 incoming freshmen have completed the survey. Students who complete the survey will receive a CMOI reusable water bottle and will be entered into a drawing for an Amazon Kindle Fire.

Plans for CMOI During the 2014-5 Academic Year:

- The freshmen survey results will be analyzed and form the basis for a conference proceedings and presentation entitled: *"What Do Students Know about the Ocean?* Assessing Ocean Literacy at the California State University Maritime Academy", at the Maritime Education Summit in Castine, Maine during October 2014.
- The Center for Engagement, Teaching and Learning will host a Faculty Learning Community (FLC) using funds obtained through the CSU Institute for Teaching and Learning (Award to S. Runyon, $5000) entitled: "Assessing and Developing Ocean Literacy as an Element of Global Stewardship in an Undergraduate Population". This FLC will bring together faculty from across the Academy to develop approaches for integrating OL into our existing curriculum.
- During spring 2015 CMOI will survey graduating seniors about their ocean OL for comparison with the results from the freshmen survey. This should provide a baseline measure of current OL of our graduates and a means for evaluating the degree to which Cal Maritime is providing graduates with OL knowledge.
- CMOI will continue to promote OL and more broadly sustainability of the ocean (as pledged by Cal Maritime through the signing of the Talloires Declaration, Spring 2014).
- CMOI will meet with leaders in the national OL movement (the center of which is at Lawrence Hall of Science) to establish ourselves as an Ocean literacy higher education institution

Content of the Curriculum

The learning outcomes and educational objectives of the program in Culture are perfectly aligned with the content of the curriculum and, within the extent of its contents, the curriculum prepares students well for the courses that they need to take later in their majors. Nevertheless, there are serious gaps in the content of the curriculum and entire topics, which are critical to the students' general education and crucial for preparing students for their fields of study have been cut out. For example: currently, the Cal Maritime student can earn a BA or BS degree without any required exposure to the arts. The effort towards reducing the curriculum to reach the CSU goal of 120 units is a major hindrance in the ability of Cal Maritime students to choose electives in general, let alone enjoy a true variety of breadth across and within the disciplines.

Organization of the Curriculum

The Culture curriculum, due to its heterogeneous nature (philosophy, literature, foreign languages, performing arts) offers students a variety of options to fulfill its requirements. Lower-division or pre-requisite courses are designed to give the students the foundations/frameworks they need to successfully master the learning outcomes and educational objectives established by upper-division or higher-sequenced Culture courses. In addition to providing students with indispensable foundational knowledge, courses in Culture offer extensive opportunities for multidisciplinary learning, because the arts and humanities can be linked to almost any field of study.

Curriculum Review Process

Curriculum matters are presented to the Curriculum Committee and are reviewed by the Committee members upon request.

Curriculum Changes

Two courses have been informally eliminated, due to campus-wide lack of compliance with Title V (Area C1):

EGL 210: Auto/Biography
EGL 325: Creative Writing

These courses still appear in the Course Catalog, but have not been taught in over a decade.

Five courses have been informally eliminated, due to faculty retirement, since 2007:

HUM 130: Creativity. Not supplanted.
EGL 320: Literature of the Fantastic. Not supplanted.
EGL 330: Literature and Psychology. Not supplanted.
HUM 305: Comparative World Religions. Not supplanted.

These courses still appear in the Course Catalog, but most have not been taught since 2007.

Two courses have been informally eliminated, because they have been or will be supplanted by new courses which better meet both Title V and Cal Maritime institution-wide requirements.

HUM 110: World Cultural Journeys. Supplanted by new courses HUM 101 & 102: Perspectives in Culture I & II.
EGL 305: 20th Century Literature. Supplanted by new courses EGL 310 & 315: U.S./World Literature of the Sea.

HUM 110 and EGL 305 still appear in the Course Catalog.

Two new courses are being taught, due to a recently instated, campuswide graduation requirement for a course in ethics:

HUM 310: Engineering Ethics
HUM 400: Ethics

Two new courses are being proposed, both of which may supplant existing courses. Both are designed to complement the proposed minor in Maritime Culture

HUM 130: Introduction to Maritime Arts. May supplant EGL 210 (C1)
HUM 100: Introduction to Maritime Culture. May supplant HUM 100: Introduction to Humanities

Curriculum Comparison

Courses offered at Cal Maritime in the Culture program are designed to comply with transferability requirements established by the CSU system. Culture courses at Cal Maritime are therefore comparable to similar courses offered at other CSU campuses.

Student Learning Goals

Student Learning Outcomes in Culture are not expected to change during the next five years. If the Department were to offer a minor in Maritime Culture, however, the Program-Level Student Learning Outcomes would expand to include additional specific educational objectives related to the new courses that would be offered by the Department.

Resources

The adequacy of current resources to maintain the quality of the Culture program during the next five years will depend on whether Cal Maritime chooses to offer a new minor in Maritime Culture or other new programs. It will also depend on the number of students coming through the program, regardless of whether the program expands or not. All indicators seem to predict that the number of students will inevitably increase, in which case the current level of resources will not suffice to meet the needs of a larger number of students coming through the program.

Departmental Information

Library, Media and Computing Resources

The use of library and media resources is adequate. Faculty research is accomplished by accessing electronic versions of academic journals through personal subscriptions, subscriptions of collaborating institutions, or by request through the library to utilize subscriptions at other CSU campuses.

Facilities

The facilities available are adequate to support the courses currently offered by the program; however, the promise of a new building (the "Information Commons") housing the library, the tutoring center, and the campus archives is of special relevance to the culture program. Such a building would be the ideal location for the Department of Culture & Communication, as it also emphasizes interdisciplinary and cultural research activity.

In addition to classrooms for lectures shared by all Cal Maritime courses, the Culture & Communication Department utilizes three computer classrooms that accommodate up to 24 students per course section. The technology enhances students' conceptual learning in information gathering and processing, as well as allows them to generate assignments in real-time, using basic computing software.

Demand for the Programs

Currently, all courses offered by the Culture & Communication Department are General Education and service courses, and the demand for the courses in the program correlates with the pre-requisites set by other departments for their own courses.

The environmental scan recently conducted at Cal Maritime predicts our student headcount to be between 1,270 and 1,920 students in the next 5 to 8 years as new programs are introduced to the Academy. Consequently, the total number of students that our Department will need to serve will increase proportionately.

Program Students

A detailed environmental scan conducted at Cal Maritime clearly indicates that the student body at the Academy is expected to grow significantly. If the predictions in the study are to be followed, the number of students interested in pursuing a minor in Maritime Culture is likely to increase. Because all Culture courses currently offered are either General Education or service courses, an increase in the number of students at the Academy will inevitably translate into a larger number of students taking Culture courses, regardless of whether or not Cal Maritime chooses to offer a new minor in Maritime Culture, or any new majors.

Career Preparation for Graduates

The Culture & Communication Department is currently not involved in preparing students for career opportunities due to the fact that there are no minors nor majors in Culture or Communication being offered at Cal Maritime at the time. As the Culture Program expands, however, students will be exposed to undergraduate research opportunities both on campus and in stimulating educational environments through collaborations with national foundations and other research institutions (e.g. Woods Hole, Mystic Seaport). Internships, visits to research institutions, research universities and industries, networking at seminars and conferences, as well as career fairs are examples of how the Culture Program envisages preparing students for career opportunities as the Academy expands.

Faculty

The number of faculty inevitably needs to grow as the number of students at the Academy increases and new programs are offered. The Retention, Tenure and Promotion process currently used to evaluate faculty ensures high-quality standards are maintained by all faculty members in the program. The willingness of the Department and the Academy to support and encourage individual faculty initiatives in research and other faculty development activities clearly stimulates faculty members and makes Cal Maritime an attractive venue to pursue an academic career in, despite the fact that current course offering in the humanities and fine arts are limited.

Department Faculty

There are twelve faculty members in the department. Five members are tenured or tenure-track, six members are lecturers, and one member is a retired professor participating in the Faculty Early Retirement Program (FERP).

The department has:

Eight faculty members with advanced degrees in Literature
One faculty member with an advanced degree in Fine Arts
Three faculty members with advanced degrees in Foreign Languages
Zero faculty members with advanced degrees in Philosophy or Humanities

Pedagogical Narrative

The faculty members in the Culture & Communication Department are committed to helping students with different backgrounds and abilities achieve the student learning outcomes and educational objectives of the program. The pedagogies employed vary among faculty and Appendix F contains the teaching philosophy and pedagogies of the Communication faculty.

Assistance to New Faculty

Prior to the fall semester, all new faculty are invited to participate in a New Faculty Orientation led by the Director of Faculty Affairs and the Director of the Center for Engagement, Teaching and Learning (CETL). At the orientation, faculty are given a copy of the Faculty Handbook and they are given an overview of the specialized nature of the Academy, including the licensed programs, the Corp of Cadets, the training ship and training cruise, and the student conduct and discipline system. The new faculty also participate in training workshops for Peoplesoft and Moodle and are invited to attend "teaching and learning workshops" sponsored by the CETL.

Evaluation of Teaching Effectiveness

Evaluation of teaching effectiveness of all faculty is required and described by the Collective Bargaining Agreement between the California State University System and the bargaining unit of the faculty, the *California Faculty Association*. Detailed procedures for evaluating teaching effectiveness of tenured and tenure-track faculty is given in the Academy's *Academic Senate Policy 526 Retention, Tenure and Promotion* and procedures for evaluating teaching effectiveness of lecturers is given in *Academic Senate Policy 528 Evaluation of Lecturers*. The teaching effectiveness of faculty are evaluated through the use of student evaluations, classroom visits by peers and department chairs, and a review of teaching materials.

Staff Resources

The department is supported by an Academic Coordinator and an Administrative Coordinator. The department is also supported by a member of the Information Technology Department who specializes in academic computing programs and hardware.

Recommendations from the Culture & Communication Department as a Result of its Self-Study

Culture & Communication Student Learning Goals

The Student Learning Outcomes in both Culture & Communication established by the Department are not expected to change. If new courses were to be offered, however, the specific educational objectives would be expanded to include new concepts. The process currently in place to review these outcomes is based on the consultation and consensus of the faculty involved in teaching the courses offered in the Department. If the faculty-student ratio remains the same during the next five years, student accomplishment of the outcomes established is not expected to change.

Communication Curriculum

1. ENG 120 is two units; one unit should be added.
2. The department should develop a course in technical writing, in order to meet the needs of our engineering-oriented students.

Culture Curriculum

1. We recommend the establishment of a Minor in Maritime Culture, as detailed in the above section. We believe that the inclusion of a Maritime Culture minor in the Culture program would be a great benefit to those students who seek a deeper and more integrated understanding of the culture(s) underlying their degree programs. Because most of the proposed curricular requirements are also Title V mandated General Education requirements, we believe that with good advising, participation in the minor would be high.
2. Other departments often require specific HUM courses as their electives. This should be investigated.
3. Ethics is a graduation requirement AND a GE course. Is this allowable?
4. C1 courses need to be developed.

Remediation in Writing

We recognize, along with many faculty from other departments and programs, the need for high-quality remediation in writing for a subset of the cadets. As the Academy grows, we can expect this need to increase. Other campuses in the CSU system and many community college math programs have extensive remediation programs, sometimes consisting of up to 4 different courses.

At CMA, we currently have one class expressly designed with remediation in mind: EGL 001 Introduction to Composition. As it is taught as a course for native English speakers, it does not pedagogically serve the needs of English language learners. Furthermore, as EGL 001 is currently taught through Extended Education, there is a disconnect between students as they remediate and as they matriculate. Therefore, we recommend that the possibility of EGL 001 returning to state-support be considered, and that an expanded, ESL-friendly remediation program be created.

Communication Faculty

1. Currently, the department employs no one with formal training in oral communication.

Culture Faculty

The environmental scan conducted at Cal Maritime predicted a steadily increasing student population in the next few years. Therefore, the number of faculty will inevitably need to increase as the number of student needing to take courses in Culture gets larger.

1. We propose to conduct a nationwide search for an Assistant Professor of Maritime History. We expect this person to teach the history courses for the American Institutions requirement, as well as be the lead person in developing and teaching courses in maritime history for the proposed minor.
2. We propose to conduct a nationwide search for an Assistant Professor in Fine Arts. We expect this person to teach the Introduction to Maritime Arts course, as well as be the lead person in developing and teaching courses in fine arts for the proposed minor.
3. We proposed to conduct a nationwide search for an Assistant Professor of Philosophy and Ethics, as the department currently employs no one with formal training in these subject areas.

Part V. Appendix: Program Review, Department of Sciences & Mathematics
May 2013 (Area B)

Co-authors:

_____	_____	_____
Lloyd Kitazono, Chair	Dr. Taiyo Inoue	Dr. Brent Pohlmann
_____	_____	_____
Dr. Jaya Punglia	Dr. Steven Runyon	Dr. Cynthia Trevisan

_____
Dr. Frank Yip

_____
Completion date of the Program Review

Programs

- **Chemistry**
- **Physics**
- **Computer Sciences**
- **Marine Sciences**
- **Mathematics**

- **Minor in Marine Sciences**

Department Mission

The mission of the Department of Sciences and Mathematics is to help students master foundational skills in sciences and mathematics that they will apply in their major fields of study, their careers, and their lives.

The goals of the Department are to:

- provide courses in sciences, mathematics, and computer sciences that meet the CSU educational requirements for depth and breadth;

- provide the skill-sets to acquire basic quantitative information, analyze the information, solve problems, formulate conclusions and alternate solutions, and create predictive models.

Department Student Learning Outcomes

The department's first student learning objectives were developed in 2000 (Appendix A)**.** Five learning objectives were created for the math courses taught by the department and six learning objectives were written for the science courses. In 2002, course-specific learning objectives were created for all courses offered by the department (Appendix B).

In 2010 the department replaced its student learning objectives (2000) with the following student learning outcomes:

<u>Sciences – Student Learning Outcomes</u>

1. Understand scientific principles and their relationship to the physical universe.

2. Use theories, principles and models, in conjunction with the scientific method, to analyze problems in science.

3. Acquire and utilize mathematical and computational techniques to both analyze and comprehend problems in science.

4. Become more proficient independent learners and effective communicators.

<u>Mathematics – Student Learning Outcomes</u>

1. Apply mathematical techniques and reasoning to problems in math.

    a. Understand and perform requisite mathematical calculations and symbolic manipulation, such as addition, subtraction, multiplication, division, exponentiation, percentages, and algebraic manipulation.

    b. Effectively organize, summarize, and present information in quantitative forms, including the use of tables, graphs, and formulas.

    c. Use appropriate technology, including calculators and computers, as tools to assist with numerical and

graphical analyses, and recognize the limitations inherent in the use of such tools.

d. Regard mathematics not simply as a set of techniques, but as a way to think, reason, and conceptualize.

2. Create mathematical expressions from a word or application problem and analyze those expressions applying mathematical principles.

   a. Translate verbal statements to and from mathematical expressions.

   b. Develop and apply, when appropriate, basic descriptive statistical techniques to data collection and analysis.

3. Demonstrate an understanding of the theoretical and practical aspects of solving problems in math.

   a. Critically evaluate quantitative information, and identify deceptive or erroneous reasoning.

   b. Interpret, make appropriate judgments, and draw reasonable conclusions based on numerical, graphical, and symbolic information.

   c. Demonstrate an understanding of the connections between mathematics and other disciplines.

4. Demonstrate the benefits and limitations of independent learning and cooperative learning.

   a. View mathematics with less anxiety, heightened interest, and increased confidence as a result of their educational experiences.

   b. Know which resources to consult in order to solve mathematical problems.

   c. Work effectively and efficiently as an independent learner.

In 2010, the Academy created an Institution-Wide Assessment Council to work on institutional student learning assessment and develop institution-wide student learning outcomes. Such outcomes were developed in 2010 and then modified and updated in July 2012. (Appendix D).
In 2013, the Sciences and Mathematics Department student learning outcomes were mapped (Appendix C) to the 2012 Institution-Wide Student Learning Outcomes (Appendix D).

Individual assessment reports shown in this program review and appendices that were conducted after July 2012 used the current Institution-Wide Student Learning Outcomes. Assessment reports written between January 2010 and July 2012 were written in reference to the 2010 Institution-Wide Student Learning Outcomes. Reports written between 2002 and 2010 were based on the 2002 Sciences and Math Course Learning Objectives (Appendix B). Assessment reports written between 2000 and 2002 were based on the General Studies Math and Science Objectives (Sept. 2000) (Appendix A).

CSU General Education Breadth Requirements

The majority of courses in the Department of Sciences and Mathematics are taught in the context of **Area B Scientific Inquiry and Quantitative Reasoning** of the CSU General Education breadth requirements (Executive Order 1065, September 16, 2011). All CSU baccalaureate degrees must contain a minimum of 12 semester units in **Area B Scientific Inquiry and Quantitative Reasoning** – one course in each subareas B1, B2, B3, B4 plus laboratory activity related to one of the completed science courses.

B1 **Physical Science**
B2 **Life Science**
B3 **Laboratory Activity** associated with a course taken to satisfy either B1 or B2
B4 **Mathematics/Quantitative Reasoning** course with an explicit intermediate algebra prerequisite

Each of the six baccalaureate degrees offered at Cal Maritime meet the CSU General Education breadth requirements in the following way:

B.A. Business Administration – International Business and Logistics
B1 – CHE 100 (3 units) or PHY 100 (3 units)
B2 – MSC 105 (3 units) or MSC 205 (3 units)
B3 – CHE 100L (1 unit) or PHY 100L (1 unit)
B4 – MTH 100 (4 units), MTH 107 (3 units)

B.S. Facilities Engineering Technology (required science and math courses):
B1 – CHE 100 (3 units), PHY 200 (3 units), PHY 205 (4 units)
B3 – CHE 100L (1 unit) and PHY 200L (1 unit)
B4 – MTH 100 (4 units), MTH 210 (4 units) and MTH 211 (4 units)

B.A. Global Studies and Maritime Affairs
B1 – CHE 100 (3 units) or PHY 100 (3 units)
B2 – MSC 105 (3 units) or MSC 205 (3 units)
B3 – CHE 100L (1 unit) or PHY 100L (1 unit)
B4 – MTH 100 (4 units), MTH 107 (3 units)

B.S. Marine Engineering Technology (required science and math courses):
B1 – CHE 100 (3 units), PHY 200 (3 units), and PHY 205 (4 units)
B3 – CHE 100L (1 unit) and PHY 200L (1 unit)
B4 – MTH 100 (4 units), MTH 210 (4 units) and MTH 211 (4 units)

B.S Marine Transportation (required science and math courses):
B1 – CHE 100 (3 units), PHY 100 (3 units)
B3 – CHE 100L (1 unit), PHY 100L (1 unit)
B4 – MTH 100 (4 units)

B.S. Mechanical Engineering
B1 – CHE 100 (3 units), PHY 200 (3 units), and PHY 205 (4 units)
B3 – CHE 100L (1 unit) and PHY 200L (1 unit)
B4 –MTH 210 (4 units), MTH 211 (4 units), MTH 212 (4 units), and MTH 215 (4 units)

Department Programs

The department does not offer a degree or major, but the department offers a minor in Marine Sciences and has programs in chemistry, physics, computer sciences, marine sciences, and mathematics.

Chemistry Program

The courses in the **Chemistry** program are:

- CHE 100 Chemistry I (3 units)
- CHE 100L Chemistry I lab (1 unit)
- CHE 205 Chemistry of Plant Processes (3 units)

CHE 100 and CHE 100L are required courses for FET, ME, MET and MT majors and may be taken by GSMA and BA majors to meet their requirement for a physical science with lab.
CHE 205 is a required course for FET majors.

Chemistry Student Learning Outcomes (SLO)

The Chemistry Program has established the following SLOs:

1. Use theories, principles and models, in conjunction with the scientific method to analyze problems in chemistry.

2. Solve quantitative problems in chemistry and demonstrate reasoning clearly and completely. Integrate multiple ideas in the problem solving process. Check results to make sure they are physically reasonable.

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

4. Become more proficient independent learners and effective communicators.

Chemistry Educational Objectives

The specific educational objectives expected of students upon successful completion of the chemistry courses currently offered at Cal Maritime follow:

Chemistry I (CHE100):

Scientific Method
- Describe the Scientific Method.
- Define and explain the terms: law, hypothesis and theory.

Chemical Calculations
- Use exponential notation.
- Solve problems using dimensional analysis, measured quantities, units of measure, and significant figures.
- Solve problems using density as the relationship between volume and mass.

Properties of Matter and Periodic Trends
- Use and define (or explain) basic chemical concepts with respect to properties of matter including:
    - Physical states of matter
    - Physical and chemical properties of matter
    - Physical and chemical changes
    - The law of conservation of mass
    - Classification of elements and compounds
    - Distinguish between pure substance, and mixtures (homogeneous and heterogeneous)
- Describe the arrangement of elements in the periodic table.
- Apply the terms: metals, nonmetals, metalloids, alkali metals, alkaline earth metals, transition metals, noble gases and halogens in the periodic table.
- Define the terms cation, anion and polyatomic ion.
- Understand periodic trends including trends in atomic radius, ionization energy and electronegativity of elements.

Atomic and Molecular Theory and Structure
- List the basic principles of Dalton's atomic theory and describe how this theory has been further developed in the 20^{th} century.
- Describe the Rutherford model of the atom.
- Describe the basic properties of protons, electrons and neutrons.
- Define atomic number, mass number, average atomic mass and isotopes.
- Use the periodic table to predict the formulas of inorganic compounds.
- Describe the Bohr model of the atom, the de Broglie modification of the Bohr model, the quantum-mechanical description of the atom, atomic orbital theory, and electron configurations of ground state and excited state atoms.
- Describe ionic bonding and covalent bonding.

- Predict covalent bonding of molecular compounds using Lewis Dot Theory.
- Predict molecular geometry, molecular shape and molecular polarity using Valence Shell Electron Pair Repulsion Theory.

Inorganic Nomenclature
- Distinguish between ionic and covalent compounds.
- Distinguish between type I and type II metal ions.
- Predict the charge of type I metal ions and mono-atomic non-metal ions.
- Predict the charge of type II metal ions using the chemical formula.
- Use IUPAC conventions to name binary ionic compounds, binary covalent compounds, ionic compounds containing polyatomic ions, and acids.

Chemical Reactions and Stoichiometry
- Represent chemical reaction using balanced chemical equations.
- Explain the information given by the balanced chemical equation.
- Identify types of chemical reactions including precipitation reactions, acid-base neutralization reactions, and oxidation-reduction reactions.
- Explain the mole concept, and use Avogadro's number to convert between moles, molecules and ions.
- Calculate the molar mass of compounds.
- Calculate the moles of atoms, ions and compounds using molar mass.
- Perform stoichiometry calculations including limiting reagent calculations and theoretical yield and percent yield calculation.
- Calculate the percent composition of compounds from the chemical formula.
- Calculate the empirical formula from percent composition.

Thermodynamics
- Differentiate between heat and temperature.
- Explain the First Law of Thermodynamics.
- Define state functions and Hess' Law.
- Calculate enthalpy changes in chemical reactions using heats of formation or Hess' Law.
- Define exothermic and endothermic, and relate these types of reactions to the relative thermodynamic stability of reactants and products.

Solutions
- List the properties of solutions and distinguish true solutions from heterogeneous mixtures and colloids.
- Define solubility, percent concentration, and molarity.
- Use the dilution equation to calculate the concentrations of diluted solutions.
- Explain factors affecting solubility.
- Predict the products of precipitation reactions using solubility rules.

Gases
- List the basic principles of Kinetic Molecular Theory.
- Define pressure, and explain the source of gas pressure in terms of Kinetic Molecular Theory.
- Relate pressure, volume, temperature and the number of moles of gas using Boyle's Law, Charles' Law, Avogadro's Law and the Ideal Gas Law.
- Explain the basis for the absolute temperature scale.
- Use gas laws in chemical stoichiometric calculations.
- Use the Ideal Gas Law to calculate the density and molecular weight of gas.
- Use Dalton's Law of Partial Pressures.
- Define and distinguish between diffusion and effusion.

Chemistry 205:

- Understand the molecular theory and structure of water and the physical and chemical properties of water.
- List the properties of solutions and distinguish true solutions from heterogeneous and colloidal mixtures.
- Define solubility, percent concentration, molarity, mole fraction, and molality.
- Explain factors affecting solubility and the rate of dissolving.
- Write molecular, total ionic and net ionic equations which show that the solution is the reaction medium.
- Use percent concentration, molarity, and molality in stoichiometric calculations.
- Understand and explain chemical equilibrium and equilibrium constants.
- Explain factors affecting equilibrium.
- Understand and explain the Common Ion Effect and Le Châtelier's Principle, especially as it pertains to solutions.
- Explain the behavior of acids and bases in terms of the Arrhenius and Brønsted-Lowry theories.
- Understand and explain the behavior of strong and weak acids and bases.
- Understand and explain the use and meaning of pH, pOH and pKa.
- Understand and explain buffers and the importance of pH control.
- Understand and explain the various components of water treatment at the industrial scale including:
  - Precipitation of undesirable solution constituents
  - Coagulation, Flocculation and Sedimentation
  - Filtration
  - Disinfection and Sterilization
  - Removal of volatile and non-volatile organic compounds

Assessment of Program's Objectives and Outcomes

The rubric and assessment criteria that follow were created by the Chemistry Program in 2010 to assess the CSLO. Mapping to the Institution-wide Student Learning Outcomes (ISLO) is included.

	Poor (1)	Acceptable (3)	Excellent (5)
CSLO 1: Use chemical theories, principles and models, in conjunction with the scientific method to analyze quantitative problems in chemistry. ISLO: B, C, D	Demonstrates little or no understanding of what information and assumptions are needed to perform the analysis. Approach is not directed to the objective of the analysis. Unable to organize the analysis.	Demonstrates some uncertainty in what information and assumptions are relevant to the analysis. Approach appears somewhat unfocused, but essentially effective. Information gathering is somewhat unorganized, but relevant.	Clearly identifies relevant known properties and appropriate assumptions. Focuses the analysis on the desired result. Gathers information in an appropriate form.
CSLO 2: Describe, explain and model chemical and physical processes at the molecular level in order to explain macroscopic properties and trends. ISLO: B, C, D	Demonstrates little or no understanding of chemical and physical processes at the molecular level, or employs principles that are not appropriate to the problem at hand.	Demonstrates some uncertainty in describing chemical and physical processes at the molecular level. Approach appears somewhat unfocused, but essentially effective.	Clearly describes chemical and physical processes at the molecular level. Demonstrates an understanding of the relationship between microscopic and macroscopic properties and trends.

CSLO 3: Perform general chemistry laboratory experiments using standard chemistry glassware and equipment and demonstrate appropriate safety procedures. ISLO: B, C	Unable to follow appropriate laboratory procedures and guidelines. Results of laboratory experimentation are ineffective.	Generally understands and follows laboratory procedures and guidelines and achieves acceptable experimental results.	Effectively follows laboratory procedures and guidelines. Successfully obtains and interprets good laboratory results.
CSLO 4: Become more proficient independent learners and effective communicators. ISLO: A, E, G, H, I, J	Lacks awareness of the connections between course contents and the world around them. Not able to apply knowledge of chemistry to new situations.	Shows some awareness of the connections between the course contents and the world around them. Shows some ability to expand or analyze new concepts.	Able to make clear and relevant connections between course content and the world around them. Develop the skills to expand or apply their knowledge to areas outside of course content.

Score	*Assessment Criteria*
1	Student has not demonstrated any ability to perform this skill.
2	Student had a partial, but unsatisfactory ability to perform the skill.
3	Student can perform the skill at an adequate, acceptable level with some mistakes.
4	Student can perform the skill fairly well with a few minor mistakes.
5	Student has demonstrated mastery of the skill with complete correct work and method.

Assessment Plan

Based on the rubric above, students were given questions and/or laboratory exercises in which they needed to:

- Organize information.
- Recognize the appropriate chemistry laws and concepts.
- Use the given data in conjunction with the physical sciences principles and concepts to arrive at a correct solution.
- Evaluate the solution to determine if it meets the test of real world constraints.

Assessment of Chemistry Student Learning Outcomes

Assessment of student learning outcomes in CHE 100 Chemistry I were conducted in Fall 2005, Fall 2007. Spring/Fall 2010, Spring/Fall 2011 and Fall 2012. One or more CSLO were chosen and assessed by each faculty member. The assessment reports for these semesters are included in Appendix E.

Trends in the Curriculum Development

Currently, all chemistry courses taught are General Education and service courses because Cal Maritime does not offer a Major or Minor in Chemistry. The courses offered are Chemistry I (CHE100), which is a first semester general

chemistry course with an associated laboratory (CHE100L), and Chemistry of Plant Processes (CHE205), a water chemistry course required for Facilities Engineering Technology majors. The contents of each course are such that they meet the transferability requirements established by the California State University (CSU) system, so opportunities for faculty to develop new trends and course offerings are lacking.

Chemistry I currently serves as a major requirement for Mechanical Engineering (ME), Facilities Engineering Technology (FET), Marine Engineering Technology (MET) and Marine Transportation (MT) degree programs, and fulfills the physical science elective requirement for Business Administration/International Business and Logistics (BA/IBL) and Global Studies and Maritime Affairs (GSMA) majors.

Content of the Curriculum

The chemistry student learning outcomes and educational objectives are aligned with the content of the curriculum and, within the extent of its contents, the curriculum prepares students for the courses that they need to take later in their majors. Nevertheless, there are serious gaps in the content of the curriculum and depth to which content is covered, which are critical to the students' general education and crucial for preparing students for their fields of study. In particular, Chemistry I (CHE100) attempts to serve all majors despite the great disparity in the foundational needs of engineering students as compared to the non-science majors. At most CSU campuses, students majoring in engineering and science (such as Mechanical Engineering) are required to take at minimum a one semester, five unit General Chemistry course (for example: Chem 1A at CSU – Sacramento or Chem 115A at CSU – Sonoma) which rigorously covers topics including:

- The Scientific Method
- Chemical Calculations
- Properties of Matter & Periodic Trends
- Inorganic Nomenclature
- Atomic and Molecular Theory and Structure
- Stoichiometry
- Thermodynamics
- Solutions
- Gases
- Acids and Bases

While these topics are addressed in Chemistry I, the depth to which these topics are covered may not sufficiently prepare engineering students for the courses that they need to take later in their majors. Additionally, the depth to which these topics are covered in Chemistry I may be too rigorous for non-science majors. Other CSU campuses offer Introductory-level chemistry courses intended to serve non-science majors that satisfy GE breadth requirements for physical science and laboratory (for example: Chemistry 6A at CSU – Sacramento or Chemistry 105 at CSU – Sonoma).

Organization of the Curriculum

The Chemistry curriculum conducts students to master fundamental scientific principles and problem solving skills that they can use to address many real life problems. To accomplish this, the courses concentrate on developing fundamental chemical concepts, constructing a framework that ties together these concepts into a coherent study of chemistry, and learning problem solving skills that allow students to apply this framework of knowledge creatively to problems that are relevant to future courses and careers. The co-requisite laboratory course is designed to complement the lecture course by providing hands-on experience related to the topics under consideration as well as provide some basic experience with scientific experimentation. Courses that students are required to take later in their major programs are solidly based on the knowledge and methodology acquired after successfully completing the chemistry courses at Cal Maritime. In addition to providing students with indispensable foundational knowledge, chemistry courses offer extensive opportunities for multidisciplinary learning, because chemistry can be linked to almost any field of study.

Curriculum Review Process

Curriculum matters are presented to the Curriculum Committee and are reviewed by the Committee members upon request.

Curriculum Changes

There have been no Chemistry courses that have been added, deleted or modified during the past five years. Students at Cal Maritime would greatly benefit from changing the existing Chemistry I into two separate Chemistry courses: one serving engineering students (General Chemistry) and one serving non-science majors (Introductory Chemistry). Both of these courses would include a laboratory co-requisite (General Chemistry Laboratory and Introductory Chemistry Laboratory, respectively). Ideally, the General Chemistry course would be an in-depth introduction to scientific principles and scientific thought by using problem-solving techniques in both a conceptual and mathematical manner. Topics covered in General Chemistry would include those currently covered in Chemistry I:

- The Scientific Method
- Chemical Calculations
- Properties of Matter & Periodic Trends
- Atomic and Molecular Theory and Structure
- Chemical Reaction Stoichiometry
- Thermodynamics
- Gases
- Solutions

The Introductory Chemistry course would introduce students to many of the ideas of Inorganic and Organic Chemistry in a way that requires only basic algebra. This course will emphasize a conceptual understanding of chemical principles and the role that chemistry plays in daily life and in decision making. Topics covered in Introductory Chemistry would ideally include:

- The Scientific Method
- Properties of Matter & Periodic Trends
- Basic Atomic and Molecular Theory and Structure
- Nomenclature of inorganic and organic compounds
- Chemical Reactions
- Heat and Energy
- Solutions
- Gases
- Nuclear Chemistry and Radioactivity

Curriculum Comparison

As previously mentioned in the “Content of the Curriculum” section above, the chemistry courses offered at Cal Maritime are very limited in comparison to other CSU campuses. In principle, courses in the chemistry program are designed to meet the transferability requirements established by the CSU system. However, the current organization of the curriculum in which a single General Chemistry course attempts to serve all majors does not seem to be the best way to prepare Cal Maritime students for future courses and careers.

Pedagogical Narrative

The faculty members in the chemistry program are committed to helping students with different backgrounds and abilities achieve the student learning outcomes and educational objectives of the program. The pedagogies employed vary among faculty and Appendix F contains the teaching philosophy and pedagogies of the chemistry faculty.

Equipment Resources

In addition to classrooms for lectures shared by all Cal Maritime courses, the Chemistry Program maintains a small laboratory classroom that can accommodate up to 24 students per course section. The laboratory equipment is such that it enhances students' conceptual learning of chemistry by adding visual and tactile components through hands-on experience. Although the current equipment adequately fulfills its purpose for basic chemical experimentation, updating it so that students become more engaged in laboratory experiments would greatly benefit the students' learning process. Particularly engaging are experiments that challenge students' predictions (as opposed to laboratory exercises in which students simply collect data). The design of the laboratory curriculum is central to serving this purpose, though is somewhat limited by the current equipment inventory. Two classes of equipment that would greatly expand the available types of experiments that could be offered to students include UV/Visual Spectrophotometers for student use and distillation kits. The introduction of state-of-the-art quantitative instrumentation (such as a mass spectrometry or gas/liquid chromatography systems) would also add value to the education of modern chemistry.

Library, Media and Computing Resources

The use of library and media resources is limited. Research conducted by students is almost exclusively done using information freely available via the World Wide Web. Faculty research is accomplished by accessing electronic versions of scientific journals through personal subscriptions, subscriptions of collaborating institutions, or by request through the library to utilize subscriptions at other CSU campuses. Computing resources are adequate for teaching in most classrooms, but limited to a single machine in the chemistry laboratory. Since many of the experiments require or at least benefit greatly from the use of computers either for data analysis or internet research, the laboratory experience would be enhanced by improved computer resources. This could be accomplished either by investing in laboratory computers or by requiring all students to bring their own personal laptop computers. The chemistry laboratory would also benefit from a dedicated printer for printing of labels as well as other laboratory-related documents such as Laboratory Guidelines (specific to a particular experiment), Material Safety Data Sheets and Chemical Inventory Sheets.

Facilities

The classroom facilities available are adequate to support the courses currently offered by the chemistry program, though the laboratory facilities are in some need of improvement. One area of improvement is related to the quality of water available inside the Chemistry Laboratory. Currently, the water available inside the chemistry laboratory is the municipal water supply which is contaminated by fairly high dissolved solid content. Water used in Chemistry experiments must be filtered to remove these dissolved solids. The current filtration system in the chemistry lab is insufficient to provide quality de-ionized water. While it has served the department in the past, the current curriculum seems to be requiring greater consumption of de-ionized water than it has in the past. This requires frequent filter replacement. A more robust system would greatly benefit the facility. Another area of improvement is related to the fume hoods. The Chemistry Laboratory contains four fume hoods for student use and one for instructor use. There is currently no on/off switch for these fume hoods located within the laboratory. To turn on the fume hoods, a switch must be accessed on the roof of the Laboratory Building by the maintenance department. It is not ideal to have the fume hoods turned on constantly due to a waste of energy and unnecessary noise. Better use of the fume hoods would be facilitated by the installation of a power switch within the laboratory.

Demand for the Program

Currently, all courses offered by the chemistry program are General Education and service courses, and the demand for the courses in the program correlates with the pre-requisites set by other departments for their own courses.

Physics Program

The courses in the **Physics** program are:

- PHY 100 General Physics I (3 units)
- PHY 100L General Physics I Lab (1 unit)
- PHY 105 General Physics II (4 units)
- PHY 200 Engineering Physics I (3 units)
- PHY 200L Engineering Physics I (1 units)
- PHY 205 Engineering Physics (4 units)

PHY 100 and PHY 100L are required for MT majors.
PHY 200, PHY 200L, and PHY 205 are required for FET, MET, and ME majors.
PHY 100, PHY 100L, PHY 200, and PHY 200L may be taken by GSMA and BA majors to meet their requirement for a physical science elective with lab.

Physics Student Learning Outcomes (PSLO)

The Physics Program at Cal Maritime has established the following PSLO:

1. Use theories, principles and models, in conjunction with the scientific method to analyze problems in physics.

2. Acquire and utilize mathematical and computational techniques to both analyze and comprehend problems in physics.

3. Understand principles and their relationship to the physical universe.

4. Become more proficient independent learners and effective communicators.

Physics Educational Objectives

The specific educational objectives expected of students upon completion of the physics courses currently offered at Cal Maritime follow:

- Understand essential properties of physical quantities, units and vectors.
- Describe and predict the motions of objects along a straight line and in a plane.
- Understand and apply Newton's laws of motion.
- Comprehend the interplay between work and energy, and use the law of conservation of energy in practical problems in physics and engineering.
- Understand the concepts of impulse and momentum, as well as the conservation of momentum in collisions.
- Describe and calculate rotation of rigid bodies and the dynamics of rotational motion. Understand and apply the concept of angular momentum and angular momentum conservation.
- Apply basic concepts of simple harmonic motion and of fluid mechanics.
- Understand essential properties of electric charge and of electromagnetic fields and forces.
- Calculate electric potential energy and understand the relationship between electric potential and electric field.
- Describe the nature of capacitors and the effects of dielectrics, and calculate the amount of energy stored in capacitors connected in series and parallel.
- Analyze direct and alternating current circuits, with multiple resistors, capacitors and inductors in series or parallel.
- Use Lenz's Law and Faraday's Law to analyze electromagnetic induction.
- Comprehend the interplay between electric and magnetic fields in electromagnetic waves.

Assessment of Program's Objectives and Outcomes

The rubric and assessment criteria that follow were created by the Physics Program to assess the PSLO. Mapping to the Institution-wide Student Learning Outcomes (ISLO) is included.

	Poor (1)	Acceptable (3)	Excellent (5)
PSLO 1: Use theories, principles and models, in conjunction with the scientific method to analyze problems in physics. ISLO: B, C, D	Demonstrates little or no understanding of what information and assumptions are needed to perform the analysis. Approach is not directed to the objective of the analysis. Unable to organize the analysis.	Demonstrates some uncertainty in what information and assumptions are relevant to the analysis. Approach appears somewhat unfocused, but essentially effective. Information gathering is somewhat unorganized, but relevant.	Clearly identifies relevant known properties and appropriate assumptions. Focuses the analysis on the desired result. Gathers information in an appropriate form.
PSLO 2: Acquire and utilize mathematical and computational techniques to both analyze and comprehend problems in physics. ISLO: B, C, D, G	No solutions are obtained, or major errors are present.	Some results in the application and calculations are obtained, but they do not directly solve the problem.	Analysis is carried out correctly. Results are correct. Units are correctly used.
PSLO 3: Understand principles and their relationship to the physical universe. ISLO: B, C, D	Unable to identify correct physical principles, or employs principles that are not appropriate to the problem at hand	Understands in a broad sense the physical principles that drive the system, but does not correctly apply them to the problem at hand.	Understands and clearly applies the correct physical principles driving the system, and their relevance to the analysis of problems.
PSLO 4: Become more proficient independent learners and effective communicators. ISLO: A, E, G, H, I, J	Lacks awareness of the connections between course contents and the world around them. Not able to apply knowledge of physics to new situations.	Shows some awareness of the connections between the course contents and the world around them. Shows some ability to expand or analyze new concepts.	Able to make clear and relevant connections between course content and the world around them. Develop the skills to expand or apply their knowledge to areas outside of course content.

Score	*Assessment Criteria*
1	Student has not demonstrated any ability to perform this skill.
2	Student had a partial, but unsatisfactory ability to perform the skill.
3	Student can perform the skill at an adequate, acceptable level with some mistakes.
4	Student can perform the skill fairly well with a few minor mistakes.
5	Student has demonstrated mastery of the skill with complete correct work and method.

Assessment Plan

1. Based on the rubric above, students were given questions and/or laboratory exercises in which they needed to:

    - Organize information.
    - Recognize the appropriate physical sciences laws and concepts.
    - Use the given data in conjunction with the physical sciences principles and concepts to arrive at a correct solution.
    - Evaluate the solution to determine if it meets the test of real world constraints.

2. Students were also required to independently explore an outside topic of interest to course content and communicate it to peers in a clear and organized manner.

Assessment Reports

Faculty in the Physics Program began writing individual assessment reports in the fall semester 2005 and continued from the fall semester 2009 through the fall semester 2011 (Appendix E). One or more PLSO were chosen and assessed by each faculty member. The results of assessments have been used to adjust the course pedagogy to the needs of the group of students taking each course.

Trends in the Curriculum Development

Currently, all physics courses taught are General Education and service courses because Cal Maritime does not offer a Major or a Minor in Physics. The courses offered are General Physics I, which is an algebra-based course that mainly covers lower division Newtonian physics and its corresponding laboratory, Engineering Physics I, a calculus-based Newtonian physics course and its corresponding laboratory, and Engineering Physics II, calculus-based electricity and magnetism. The contents of each course are such that they meet the transferability requirements established by the California State University (CSU) system, so opportunities for faculty to develop new trends and course offerings are lacking. Some students at Cal Maritime have expressed interest in pursuing a Physics Minor. Students who became interested in physics have seen the need to transfer to other schools to major in physics, as well as to pursue Masters and Ph. D. degrees in physics. A desirable new trend in curriculum development over the next five years, therefore, would be to offer courses that would allow students to minor in physics. Offering a minor in physics would help meet one of the important goals of Cal Maritime's Academic Master Plan, which is to develop academic minors to offer students opportunities beyond their major course of study (Goal AP-3).

In order for students to minor in physics at Cal Maritime, only two additional courses would need to be offered. An outline of course requirements for a minor in physics comparable to minors in physics offered at other CSU campuses follows.

Minor in Physics Course Requirements

Required Lower Division Courses (12 units):

- Engineering Physics I: Mechanics (4 units) – Currently offered
- Engineering Physics II: Electricity and Magnetism (4 units) – Currently offered
- Engineering Physics III: Heat, Light and Sound (4 units) – Required for students majoring in Mechanical Engineering in the past, but no longer offered.

Required Upper Division Courses (9 units):

- Introduction to Modern Physics (3 units) – New course

- Electronics and Instrumentation (4 units) – Currently offered as Electrical Circuits (ME 250, ET 250), Electrical Circuits Laboratory (ME 250L, ET 250L) or Electricity and Electronics (NAV 310)
- Thermodynamics (2 units) – Currently offered in the as Engineering Thermodynamics (ME 240) or Thermodynamics (ET 344).

Content of the Curriculum

The physics student learning outcomes and educational objectives are perfectly aligned with the content of the curriculum and, within the extent of its contents, the curriculum prepares students well for the courses that they need to take later in their majors. Nevertheless, there are serious gaps in the content of the curriculum and entire topics, which are critical to the students' general education and crucial for preparing students for their fields of study have been cut out. Topics such as heat, light and sound are no longer among the contents of any of the physic courses offered at Cal Maritime. The effort towards reducing the curriculum to reach the CSU goal of 120 units is a major hindrance in the preparation of students for more advanced courses in their majors, because covering important topics that are currently unavailable to students would mean offering at least one additional physics course.

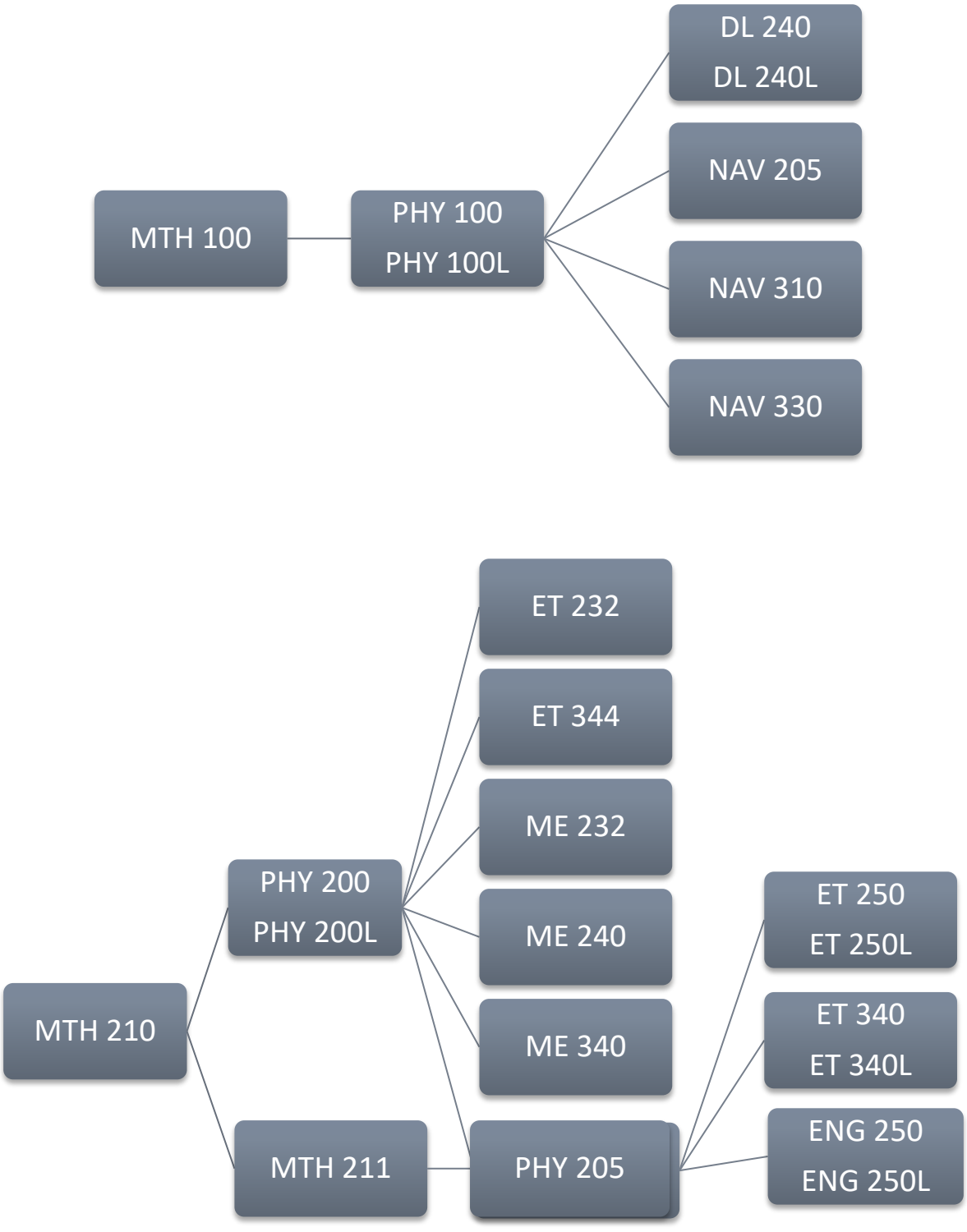
Organization of the Curriculum

The physics curriculum conducts students to learn in a capstone manner. Pre-requisite and co-requisite courses are designed to give the students the foundations they need to successfully master the learning outcomes and educational objectives established by each course. At the same time, courses that students are required to take later in their major programs are solidly based on the knowledge and methodology acquired after successfully completing the physics courses at Cal Maritime. In addition to providing students with indispensable foundational knowledge, physics courses offer extensive opportunities for multidisciplinary learning, because physics can be linked to almost any field of study.

Curriculum Flow Chart

As mentioned in the previous section, students taking physics courses are mentored so that each new skill acquired builds on previously mastered knowledge. The course activities and assignments are set so that students are exposed to new concepts and methodologies that will lead them towards the achievement of the outcomes established for the physics program. At the same time, the physics courses at Cal Maritime are closely connected to the outcome of other programs. The following flow chart illustrates how physics is currently linked to other courses at Cal Maritime.

Physics Program Curriculum Flow Chart



Physics Program Curriculum Flow Chart Key:

MTH 100: College Algebra and Trigonometry
MTH 210: Calculus I
MTH 211 Calculus II

DL 220: Global Maritime Distress Safety System
DL 220L: Global Maritime Distress Safety System Laboratory

PHY 100: Physics I
PHY 100L: Physics I Laboratory
PHY 200: Engineering Physics I
PHY 200L: Engineering Physics I Laboratory
PHY 205: Engineering Physics II

NAV 205: Ship Stability
NAV 310: Electricity and Electronics
NAV 330: Meteorology

ET 232: Statics
ET 250: Electrical Circuits
ET 250L: Electrical Circuits Laboratory
ET 340: Fluid Mechanics
ET 340L: Fluid Mechanics Laboratory
ET 344: Thermodynamics

ME 232: Engineering Statics
ME 240: Engineering Thermodynamics
ME 340: Engineering Fluid Mechanics

ENG 250: Electrical Circuits and Electronics
ENG 250L: Electrical Circuits and Electronics Laboratory

Curriculum Review Process

Curriculum matters are presented to the Curriculum Committee and are reviewed by the Committee members upon request.

Curriculum Changes

There have been two courses that have been eliminated during the past five years. The first course, Physics II (PHY 105), an algebra-based course that studied principles of electricity and magnetism, still appears listed in our school catalog. The other course eliminated, Engineering Physics III (PHY 210), was a calculus-based course that explored concepts of heat, light and sound.

In the past, students majoring in Mechanical Engineering were required to take Engineering Physics I, II and III. Engineering Physics III ceased to be a required course for Mechanical Engineering Majors in order to reduce the number of total course units for that major.

Another curriculum change occurred when students majoring in Engineering Technology were required to take calculus and calculus-based physics courses. Students majoring in Engineering Technology had until then been required to take (algebra-based) Physics I and II instead of the (calculus-based) Engineering Physics I and II courses that are currently required.

Curriculum Comparison

Courses offered at Cal Maritime in the physics program are designed to meet the transferability requirements established by the CSU system. Physics courses at Cal Maritime are therefore comparable to similar courses offered at other CSU campuses.

Pedagogical Narrative

The faculty members in the physics program are committed to helping students with different backgrounds and abilities achieve the student learning outcomes and educational objectives of the program. The pedagogies employed vary among faculty and Appendix F contains the teaching philosophy and pedagogies of the physics faculty.

Equipment Resources

In addition to classrooms for lectures, the physics program counts with a small laboratory that can accommodate up to 18 students. The laboratory equipment is such that it enhances students' conceptual learning of mechanics by adding visual and tactile components through hands-on experience. Although the equipment adequately fulfills its purpose, updating it so that students become more engaged in laboratory experiments would greatly benefit the students' learning process. Particularly engaging are experiments that challenge students' predictions (as opposed to laboratory exercises in which students simply collect data). If the program were to expand to offer a minor in physics, the Department might want to consider acquiring laboratory equipment for one of the courses it currently offers, Engineering Physics II, as well as for one of the two new courses that would need to be taught (Engineering Physics III: Heat, Light and Sound). Equipment for class demonstration in lower division courses would also be highly valuable.

Information technology plays an important role in the physics program. Electronic devices and software are used ubiquitously as tools to help students achieve a deeper conceptual understanding of the topics to be learned and as student-engagement and assessment technique aids. Examples of computer-based resources currently being used in the program are individual response units (clickers), online homework management systems and tutorials, and simulations.

Library, Media and Computing Resources

The use of library and media resources is limited. Research conducted by students is almost exclusively done using information freely available via the World Wide Web. Faculty research is accomplished by accessing electronic versions of scientific journals through subscriptions of collaborating institutions, such as the Lawrence Berkeley National Laboratory. Computing resources are adequate for teaching in most classrooms, but limited and dated in the physics laboratory. Computing resources are inadequate for faculty research, which needs to be conducted on Unix-based operating systems that are currently not supported by Cal Maritime.

Facilities

The facilities available are adequate to support the courses currently offered by the program, but inadequate to include students in the research programs of individual faculty. The current facilities might also present a challenge if the program were to be expanded and new laboratory sessions were offered.

Demand for the Program

Currently, all courses offered by the physics program are General Education and service courses, and the demand for the courses in the program correlates with the pre-requisites set by other departments for their own courses.

The environmental scan recently conducted at Cal Maritime predicts our student headcount to be between 1,270 and 1,920 students in the next 5 to 8 years as new programs are introduced to the Academy. Consequently, the total number of students that our Department will need to serve will increase proportionately.

Student Learning Goals

Physics Student Learning Outcomes are not expected to change during the next five years. If the Department were to offer a minor in physics, however, the Physics Educational Objectives would expand to include additional specific educational objectives related to the two new courses that would be offered by the Department.

The process by which the Physics Student Learning Outcomes are reviewed has been described earlier in this document.

Curriculum

If a minor in physics were to be offered, the curriculum should include the two additional courses listed in the subsection: "Minor in Physics Course Requirements"), namely, Engineering Physics III: Heat, Light and Sound (4 unit lower division course) and Introduction to Modern Physics (3 unit upper division course). Other courses required to complete a minor in physics could be taken in the Department of Mechanical Engineering or in the Department of Engineering Technology.

Program Students

A detailed environmental scan conducted at Cal Maritime clearly indicates that the student body at the Academy is expected to grow significantly. If the recommendations by the study are to be followed and the Academy were to offer majors in areas identified as having the greatest potential of growth and relevance to Cal Maritime's mission (such as Environmental Science), the number of students interested in pursuing a minor in physics is likely to increase. Because all physics courses currently offered are either General Education or service courses, an increase in the number of students at the Academy will inevitably translate into a larger number of students taking physics courses, regardless of whether or not Cal Maritime chooses to offer a new minor in physics or any new majors.

Career Preparation for Graduates

The Physics Program is currently not involved in preparing students for career opportunities due to the fact that there are no minors nor majors in physics being offered at Cal Maritime at the time. As the Physics Program expands, however, students will be exposed to undergraduate research opportunities both on campus and in stimulating laboratory environments through collaborations with national laboratories and other research institutions. Internships, visits to research institutions, research universities and industries, networking at seminars and conferences, as well as career fairs are examples of how the Physics Program envisages preparing students for career opportunities as the Academy expands to accommodate new career paths in science.

Faculty

The number of faculty inevitably needs to grow as the number of students at the Academy increases and new programs are offered. The Retention, Tenure and Promotion process currently used to evaluate faculty ensures high-quality standards are maintained by all faculty members in the program. The willingness of the Department and the Academy to support and encourage individual faculty initiatives in research and other faculty development activities clearly stimulates faculty members and makes Cal Maritime an attractive venue to pursue an academic career in, despite the fact that current course offering in physics are limited to lower division courses only.

Resources

The adequacy of current resources to maintain the quality of the physics program during the next five years will depend on whether Cal Maritime chooses to offer a new minor in physics or other new programs. It will also depend on the number of students coming through the program, regardless of whether the program expands or not. All indicators seem to predict that the number of students will inevitably increase, in which case the current level of resources will not suffice to meet the needs of a larger number of students coming through the program.

Computer Science Program

The courses in the **Computer Science** program are:

- COM 100 Introduction to Computers (2 units)
- COM 220 Programming Applications for Engineering Technology (ET) Majors (1 unit)
- COM 220L Programming Applications for Engineering Technology Majors Lab (1 unit)
- COM 395 GIS – Geographic Information Systems (3 units)

Curriculum

COM 100 is a required for Marine Transportation (MT) majors and taken during the first semester of their freshmen year. COM 220 and COM 220L are required courses for MET and FET majors and taken during the first semester of their sophomore year, and these course are taught by faculty from the Engineering Technology Department.

COM 395 Geographic Information Systems (GIS) (3 units) is a relatively new course and was added to the curriculum in 2010 as an elective course for all majors. It was taught for the first time during the spring semester of 2010, the fall semester of 2012, and will be taught again in the fall of 2013. GIS is taught at the other 22 CSU campuses and most other campuses are members of the CSU GIS program. http://www.calstate.edu/gis/. The Academy is not yet member of the CSU GIS program, but we have attended the annual CSU GIS meetings during the summer.

Resources

There are three computer labs on campus each with 24 computer stations connected to the campus network and internet. The campus computers are well maintained and kept up to date with software and computing capability by our Information Technology (IT) staff. One full-time IT staff member provides good support to the faculty with academic computing technologies. This staff member offers training workshops and one-on-one help to any faculty member who asks for assistance.

The Academy is considering a plan to make it a requirement for all incoming students to have a laptop computer. If this plan becomes a reality, the computer labs would no longer be needed because any classroom could serve as a computer lab.

Our COM 100 and COM 395 courses are taught by a full-time lecturer, and as mentioned earlier, COM 200 and COM 200L are taught by faculty from the Engineering Technology Department.

Computer Science 100 Student Learning Outcomes

- Understand the basics of microcomputers and application software that students will use in their academic and professional lives
- Introduce students to more advanced topics and software programs
- Challenge students in using software as decision-making and management tools

Computer Science 100 Student Learning Objectives

- Use Microsoft (MS) Word to create documents and learn how to use the advanced features of MS
- Use MS PowerPoint to create presentations and learn how use the advanced features of MS PowerPoint
- Use MS Excel to create spreadsheets and learn how to use the advanced features of MS Excel
- Use MS Access as a database manager of information and learn how to use the advanced features of MS Access
- Use MS Project as a management tool and learn how to use the advanced features of MS Project
- Introduce students to using HTML code to create webpages
- Introduce students to the use of Solidworks, a 3-D drawing program

- Introduce students to the use of Geographical Information Systems (GIS) a digital mapping program

Assessment of Computer Science 100 Student Learning Outcomes

The course student learning outcomes were assessed in four sections of COM 100 in the fall semester 2005 (Appendix E).

The methods used to assess student learning outcomes were:

- Questions in exams which require critical thinking skills and recall of knowledge
- Case studies requiring Internet research and use of applications
- Graded lab activities involving various computer skills
- Student self-assessments performed several times during the course
- Student projects using specific computer applications
- Student presentations on projects in MS PowerPoint and MS Word

Discoveries Made

- Students were more interested in hands-on work than learning about technology of computers. Students expected structured lessons and assignments. More emphasis on applications and projects involving applications should be included in curriculum. Student performance was better with hands-on activities than in-class exams.

Future Plans

- Lesson plans will include less technology lectures and labs and more in-class, hands-on work assignments. Instructor-created student evaluations will take place earlier in the semester. More individual assessment sessions will be included in the curriculum, both at the beginning and the end of the semester.

The course student learning outcomes were assessed in two sections of COM 220 in the fall semester 2005 (Appendix E).. The strategies used to assess the outcomes were examinations and projects. At the beginning of the semester the average exam score was 26% and at the end of the semester the average exam score was 90%. The projects and examinations given showed the outcomes were achieved. A single group project should be added to encourage the students in helping each other and to improve the slower members of the group.

The Computer Science Student Learning Outcomes and Student Learning Objectives can be mapped to the Institution-Wide Student Learning Outcome G. Information Fluency and Computing Technology. There has not been a consistent plan for assessing Computer Science Student Learning Outcome and Student Learning Objectives. A strategy for assessing student learning outcome and student learning objectives should be developed and implemented.

Marine Science Program

The courses in the **Marine Science** program are:

- MSC 100 Introduction to Geological and Chemical Oceanography (3 units)
- MSC 105 Introduction to Biological and Physical Oceanography (3 units)
- MSC 200 Oceanographic Instruments and Analysis (3 units)
- MSC 200L Oceanographic Instruments and Analysis Lab (0 units)
- MSC 205 Marine Biology (3 units)
- MSC 390 Independent Study in Marine Sciences (1-3 units)

Either MSC 105 or MSC 205 may be taken by GSMA and BA majors to meet their General Education Requirement: B2 Life Science.

Curriculum

The marine science curriculum was developed over 35 years ago and it was created at a time when the school only offered two majors (Marine Engineering Technology and Nautical Industrial Technology) and each major had open electives in their curriculum and many students could take a marine science course as one their open electives. Presently, students no longer have open electives in their curriculum, and few students have room in their schedule to take marine science courses and usually do so as an overload to their schedule.

Marine Science Minor

The Department of Sciences and Mathematics offers a minor in marine sciences.
The Marine Science Minor is designed for students interested in pursuing a career working on research vessels, continuing their studies in marine sciences, or just having an interest in marine sciences. To complete the minor, students must complete at least 15 units of approved marine science courses, including MSC 390 Independent Study. The MSC 390 Independent Study is a culminating project or term paper usually completed during the student's senior year but may be completed earlier. Students who complete the Marine Science Minor receive a certificate of completion and a notation on their official transcript indicating the completion of the minor.

Requirements for the Marine Science Minor (at least 15 total units)

MSC 390	Independent Study in Marine Sciences	3

At least nine (9) units from the following Marine Science courses:

MSC 100	Introduction to Geological & Chemical Oceanography	3
MSC 105	Introduction to Biological & Physical Oceanography	3
MSC 200	Oceanographic Instruments & Analysis	3
MSC 205	Marine Biology	3

Additional courses from the following may be used to fulfill the 15-unit requirement for the minor:

NAU 330	Meteorology (not MT majors)	3
GMA 105	Ocean Politics (not GSMA majors)	3

Program Outcomes and Objectives

The Marine Science program outcomes are the same as the department's science student learning outcomes. Each course in the marine science program has student learning objectives described in the course syllabus (Appendix B).

Since the Marine Sciences Minor was created in 1976, fifty-three (53) students have completed the minor. Graduates with the minor have gone on to graduate schools, including law school, have been employed on research vessels (Scripps Institute of Oceanography, Woods Hole Oceanographic Institute, Moss Landing Marine Labs, and National Oceanographic and Atmospheric Administration, and the Army Corps of Engineers), and one graduate went on to work for the U.S. Navy Research Program with Marine Mammals.

Assessment of Marine Sciences Student Learning Outcomes

In the fall 2005 semester, the following student learning outcomes were assessed in MSC 205 Marine Biology (Appendix E):

- To recognize and understand basic terms and concepts of marine biology
- To understand both the general and habitat-specific biological processes that occur in marine environments
- To understand the relevance of marine biology to current scientific, social, and economic arenas
- To use critical thinking skills to evaluate scientific studies and media reports involving the sciences

The outcomes were assessed during the semester with examinations and critical thinking assignments. It was discovered that students learned best when both board writing and power point were used together, reinforcing one another's content.

In the fall 2009 semester, the pedagogy for teaching MSC 100 Introduction to Geological & Chemical Oceanography was significantly changed. The method of instruction was changed from a traditional lecture course using PowerPoint presentations to a learner-centered course where students gave presentations on the course material. No textbook was used in the course, which was a change from using a traditional introductory to oceanography text for the past 31 years. Basically, each student was given a different set of questions to answer related to the course material and they were responsible for finding answers to the questions on their own. At the next class session, the student would give a presentation to the rest of the class on their answers. Often times the presentations promoted questions from the class and discussions, and the instructor would serve as the facilitator of the discussions. This change in pedagogy was well received by the students in the class and has been adopted as the standard method of teaching MSC 100 and MSC 105.

In the fall 2010 semester, MSC 105 was taught using the learner-centered method of instruction and two Institution-Wide Student Learning Outcomes (IWSLOs) were assessed: IWSLO-D – Human Development in the Natural World and IWSLO-E – Lifelong Learning (Appendix D). The IWSLOs were assessed by including questions in the final exam that addressed the two IWSLOs. By using a rubric with a range of 1 to 6 for evaluating the answers to the questions where 1-2 indicated "emerging understanding", 3-4 indicated "developing understanding", and 5-6 indicated "mastering understanding", the average score on the first question (IWSLO-D) was 4.44 and the average score on the second question (IWSLO-E) was 4.50.

The results of the assessment indicate that a high percentage of students in the class could demonstrate a good understanding of fundamental concepts in oceanography. 83% of the students scored 4.0 or higher on question 1. The results also indicated that even a higher percentage of students had a good understanding of the factors that influenced and enhanced their learning. 89% of the students scored 4.0 or higher on question 2. The results indicate that a large percentage of students achieved both of the IWSLOs of the class and indicates that the method used in the MSC 105 was successful at helping the students learn. No changes in pedagogy are warranted for MSC 105.

In the spring 2011 semester, MSC 100 was taught using the learner-centered method of instruction and at the end of the semester students were asked for their anonymous opinions about the method of instruction (Appendix E). Overall, the students were strongly in favor of how the class was conducted. They preferred doing homework assignments and giving presentations over having instructor lectures. The majority of students who responded (7 out of 9) indicated that they thought they learned as much material with the learner-center method as with the instructor-centered method. When asked what they liked about the course, students gave the following responses:

> *"It is fun; I learned a lot; I learned that I learn best when I teach; I liked giving presentations a lot, it let me go more in depth into topics and control how much I put into and then share it with others; Made it engaging to learn, not boring; Learned a lot".*

When students were asked what they did not like about the course, they gave some of the following answers:

"Some presentations were too long; some students just read their PPT; The instructor should lecture a bit more, he is an invaluable source of information that we may not know; I did not like having instructor lecture; The tests I thought covered too much material; There was nothing I did not like; The time of the final exam; That is at 9:00 AM in the morning".

Assessment Plans for the Future

Instructors should continue assessing Marine Science Student Learning Outcomes and Student Learning Objectives in all marine science courses.

Resources for the Marine Science Program

The Marine Science Program has the following resources for the program, which are used primarily for the instruction of MSC 200 Oceanographic Instruments and Analysis:

- Kahlisco Induction Salinometer, Model RS7-C
- Turner Model 330 Spectrophotometer
- Turner Model 111 Filter Fluorometer
- Kahlsico Model 268WA310 Submarine Photometer
- InterOcean Model 513E Portable Mini-CTD
- Fisher Accumet Model 815 MP pH Meter
- 6 General Oceanic 5-liter Niskin bottle
- 4 Deep-sea reversing thermometers

During semesters when MSC 200 is taught, the combined cost of renting a research vessel for collecting water samples and chemicals and equipment to conduct the course is approximately $800.

Mathematics Program

The courses in the **Mathematics** program are:

- MTH 100 College Algebra & Trigonometry (4 units)

- MTH 105 Finite Math (3 units)
- MTH 107 Elementary Statistics (3 units)
- MTH 205 Calculus for Business (3 units)
- MTH 210 Calculus I (4 units)
- MTH 211 Calculus II (4 units)
- MTH 212 Calculus III (4 units)
- MTH 215 Differential Equations (4 units)

MTH 100 is required by all majors except ME majors. MTH 107 is required by GSMA and BA majors. MTH 205 is required by BA majors. MTH 210 and MTH 211 are required by FET and MET majors. MTH 210, MTH 211, MTH 212, and MTH 215 are required by ME majors.

The Math Student Learning Outcomes are:

1. Apply mathematical techniques and reasoning to problems in math.
   a. understand and perform requisite mathematical calculations and symbolic manipulation, such as addition, subtraction, multiplication, division, exponentiation, percentages, and algebraic manipulation;
   b. effectively organize, summarize, and present information in quantitative forms, including the use of tables, graphs, and formulas;
   c. use appropriate technology, including calculators and computers, as tools to assist with numerical and graphical analyses, and recognize the limitations inherent in the use of such tools;
   d. regard mathematics not simply as a set of techniques, but as a way to think, reason, and conceptualize.

2. Create mathematical expressions from a word or application problem and analyze those expressions applying mathematical principles.
   a. translate verbal statements to and from mathematical expressions;
   b. develop and apply, when appropriate, basic descriptive statistical techniques to data collection and analysis;

3. Demonstrate an understanding of the theoretical and practical aspects of solving problems in math.
   a. critically evaluate quantitative information, and identify deceptive or erroneous reasoning;
   b. interpret, make appropriate judgments, and draw reasonable conclusions based on numerical, graphical, and symbolic information;
   c. demonstrate an understanding of the connections between mathematics and other disciplines

4. Demonstrate the benefits and limitations of independent learning and cooperative learning.
   a. view mathematics with less anxiety, heightened interest, and increased confidence as a result of their educational experiences;
   b. know which resources to consult in order to solve mathematical problems.
   c. perform effectively and efficiently as an independent learner

Assessment of Math Student Learning Outcomes and Objectives

In the fall 2000, spring 2001 and fall 2001 all students in of MTH 100 College Algebra & Trigonometry were assessed for how much they improved in their understanding of topics covered in the course. A diagnostic test was given to all students at the beginning and end of the course and percentage of correct answers were compared. The results of the assessment are shown below:

Fall 2000

	Section 1	Section 2	Section 3	Section 4
Number of students	14	31	27	9
Percent correct on initial diagnostic test	9%	17%	38%	23%

Percent correct on final diagnostic test	46%	66%	94%	77%
Percent change	+ 37%	+ 49%	+56%	+ 54%

Spring 2001

	Section 1	Section 2
Number of students	23	23
Percent correct on initial diagnostic exam	34%	12%
Percent correct on final diagnostic exam	56%	54%
Percent change	+ 22%	+ 42%

Fall 2001

	Section 1	Section 2	Section 3	Section 4
Number of students	15	12	24	16
Percent correct on initial diagnostic test	39%	13%	7%	6%
Percent correct on final diagnostic test	64%	55%	46%	40%
Percent change	+ 25%	+ 42%	+39%	+ 34%

The results of this assessment showed that students improved their understanding of topics in MTH 100 significantly by taking the course; an average improvement of 40%. The results of the assessment indicated that no changes were needed in the instruction of MTH 100.

Since MTH 100 is an important, foundational math course taken by all majors except Mechanical Engineers, a survey of the faculty in the Marine Transportation, Engineering Technology, and Maritime Policy and Management departments was conducted during the fall 2010 semester to determine which topics in MTH 100 were considered to be the most important topics for students to learn in the respective departments. The results of the survey led to the creation of a list of "core topics" (Appendix G) that the math faculty have agreed will be covered in every section of MTH 100. Beginning the fall 2011 semester, the list of core topics was taught and emphasized in all sections of MTH 100.

Changes in the Math Curriculum

Since 1995, when the Academy became a campus of The California State University System and until the spring semester 2005, the Department offered MTH 001 Intermediate Algebra in its curriculum for students needing remediation in math. Students who successfully completed MTH 001 or its equivalent could matriculate to MTH 100 College Algebra & Trigonometry. Students who did not successfully complete MTH 001 or its equivalent during their first year at the Academy could not enroll in their second year at the Academy. Beginning in the fall semester

2005, the Department stopped offering MTH 001 as part of its regular course offerings and the administration of MTH 001 was assumed by the Academy's Extended Learning Program. Outsourcing MTH 001 to the Extended Learning Program has increased the financial cost to the students because they must pay $400 to Extended Learning, which is in addition to their regular Academy fees. Another negative impact of outsourcing MTH 001 to Extended Learning, is the drop in enrollment in the course. Before outsourcing MTH 001 to Extended Learning, 40 to 50 students would enroll in the course during the fall semester, but since the 2005 the enrollment has steadily declined and in 2011 and 2012, not enough students signed up for MTH 001 through Extended Learning to justify offering the course.

During the academic year, 2006-2007, the Engineering Technology Department made a change in their curriculum and replaced MTH 200 Technical Calculus I and MTH 201 Technical Calculus II with MTH 210 Calculus I and MTH 211 Calculus II. This change has been beneficial for MET, FET, and ME students because multiple sections of MTH 210 and MTH 211 could be offered every semester, which gives more scheduling options for the engineering students.

During the academic year, 2009-2010, the Maritime Policy and Management Department made a change in their curriculum and replaced BUS 205 Business Statistics with MTH 107 Elementary Statistics. This change has been beneficial for BA and GSMA students because MTH 107 is offered every semester, which gives more scheduling options to the students.

During the spring semester 2011, our department proposed a curriculum change to raise the minimum grades in prerequisite math courses for MTH 205 Calculus for Business, MTH 210 Calculus I, and MTH 211 Calculus II from passing (D) to a (C−) or higher (Appendix H). The department conducted a study of past students who received D's in prerequisite math courses and we found that these students, with few exceptions, went on to fail the next math course. Our evidence was so compelling that the Curriculum Committee strongly supported our proposal and the minimum grade in prerequisite math courses was raised from a (D) to a (C−) in MTH 205, MTH 210, and MTH 211.

Math Remediation

Like all other CSU campuses, the Academy has a number of incoming students who need math remediation. The trend over the past six years has shown that fewer incoming students need math remediation (Appendix I), which indicates that the present incoming students are better prepared, in terms of math skills, than past incoming students.

Year	Total Number of Incoming Students	Number (%) Needing Math Remediation
2007	269	32 (12%)
2008	250	40 (16%)
2009	259	45 (17%)
2010	299	35 (12%)
2011	289	20 (7%)
2012	325	18 (6%)

Whereas other CSU campuses offer many sections of math remediation at multiple levels (Developmental Math through Intermediate Algebra), we only offers one level of remedial math (MTH 001 Intermediate Algebra), and in recent year, only one section of MTH 001 was offered. Before the fall 2005, MTH 001 was offered through the regular schedule of classes during the fall semesters. Between fall of 2005 and fall of 2012, MTH 001 was not offered through the regular schedule of classes; it was offered through the Academy's Office of Sponsored Projects and Extended Learning (SPEL). Students needing to enroll in MTH 001 through SPEL paid an extra fee for the class and took the course during the evening hours or late afternoons along with their regularly scheduled classes in the fall. Beginning in the fall of 2013, MTH 001 will again be offered through the regular schedule of classes.

Department Faculty

There are fourteen (14) faculty members in the department. Seven members are tenured or tenure-track, six members are lecturers, and one member is a retired professor participating in the Faculty Early Retirement Program (FERP).

The department has:

- two Assistant Professors and one FERP Professor in the Chemistry program,
- one full-time lecturer in the Computer Science program,
- one Professor and one part-time lecturer in the Marine Science program,
- two Assistant Professors and three part-time lecturers in the Math program, and
- one Professor, one Assistant Professor, and one part-time lecturer in the Physics program.

The curriculum vitas of the tenured and tenure-track faculty can be found in Appendix J..

Assistance to New Faculty

Just prior to the fall semester, all new faculty are invited to participate in a New Faculty Orientation led by the Director of Faculty Affairs and the Director of the Center for Engagement, Teaching and Learning (CETL). At the orientation, faculty are given a copy of the Faculty Handbook and they are given an overview of the specialized nature of the Academy, including the licensed programs, the Corp of Cadets, the training ship and training cruise, and the student conduct and discipline system. The new faculty also participate in training workshops for Peoplesoft and Moodle and are invited to attend "teaching and learning workshops" sponsored by the CETL.

Evaluation of Teaching Effectiveness

Evaluation of teaching effectiveness of all faculty is required and described by the Collective Bargaining Agreement between the California State University System and the bargaining unit of the faculty, the *California Faculty Association*. Detailed procedures for evaluating teaching effectiveness of tenured and tenure-track faculty is given in the Academy's *Academic Senate Policy 526 Retention, Tenure and Promotion* and procedures for evaluating teaching effectiveness of lecturers is given in *Academic Senate Policy 528 Evaluation of Lecturers*. The teaching effectiveness of faculty are evaluated through the use of student evaluations, classroom visits by peers and department chairs, and a review of teaching materials.

Staff Resources

The department is supported by an Academic Coordinator and an Administrative Coordinator. The department is also supported by a member of the Information Technology Department who specializes in academic computing programs and hardware.

Operating Budget

The annual operating budget for Department of Sciences and Mathematics is approximately $7,233. The Department receives $2,500 for communications (telephones), $1,500 for travel, and $3,233 for supplies, postage, and printing. The annual operating budget has remained largely unchanged for many years except for increases due to increasing number of lecturers. The chemistry, physics, and oceanography labs were run on a very tight budget and faculty often used their own funds and made lab equipment to supply the labs. However in an effort to upgrade the existing chemistry and physics labs and replace broken or missing equipment and supplies the existing budget for supplies has been exceeded well beyond $3,233. This action was taken with the approval from the Academic Dean who said to "buy whatever is necessary to operate the labs". The following table is a summary of the cost per student who enrolls in labs.

Academic Year	Cost of Supplies	Number of Students (chemistry, physics, ocean)	Cost/Student
2011-2012	$6,758	357	$19/student

2012-2013	$4,857	438	$11/student

The cost for supplies in 2011-2012 was higher even though the number of students served was lower because 2011-2012 was a "start-up" year with new supplies and those supplies were reused in 2012-2013.

Demand for the Program

The department provides required courses in all majors at the Academy and the courses are the foundational prerequisite courses for over sixty courses at the Academy (Appendix K**).**

In 2005, the department drafted a proposal to offer a bachelors degree in Sciences and Mathematics. The degree was designed specifically for individuals interested in becoming high school science and math teachers (Appendix L). At the time and still today, our nation and state, has a chronic shortage of qualified science and math teachers in its high schools and junior high schools. A recent report by the National Center for Educational Statistics showed that 37% of the high school math teachers and 31% of high school science teachers lacked the proper educational background or certification to teach the classes they were teaching.

The degree in Sciences and Mathematics was designed to increase the number of credentialed high school teachers in chemistry, physics, and mathematics. The proposal projected that the first entering class (fall 2007) would have had approximately 30 students and continued to grow at a rate of 30 new students each year. Our graduates would have expanded enrollments in fifth-year credential programs starting no later than the fall of 2011, with roughly 120 students. Upon completion of fifth-year credential programs our graduates would have been certified to teach all secondary-level mathematics courses and either chemistry or physics (including AP chemistry and AP physics) in California's high schools.

The proposal to offer a Science and Math degree was put on hold and the proposal was incorporated into the 2009 Academic Master Plan.

Recommendations from the Department as a Result of its Self-Study

Chemistry Student Learning Goals
The Chemistry Student Learning Outcomes (CSLO) established by the Chemistry Program are not expected to change. If new courses were to be offered, however, the specific educational objectives would be expanded to include new concepts.

The process currently in place to review the CSLO is based on the consultation and consensus of the faculty involved in teaching the courses offered in the Program. If the faculty-student ratio remains the same during the next five years, student accomplishment of the outcomes established is not expected to change. If new laboratories or review/problem-solving sessions were to be offered in the future, student accomplishment of CSLO is likely to increase.

Physics Student Learning Goals
The Physics Student Learning Outcomes (PSLO) established by the Physics Program are not expected to change. If new courses were to be offered, however, the specific educational objectives would be expanded to include new concepts.

The process currently in place to review the PSLO is based on the consultation and consensus of the faculty involved in teaching the courses offered in the Program. If the faculty-student ratio remains the same during the next five years, student accomplishment of the outcomes established is not expected to change. If new laboratories or review/problem-solving sessions were to be offered in the future, student accomplishment of PSLO is likely to increase.

Chemistry Curriculum

The Chemistry Program recommends that the courses currently offered be expanded to better serve the students. Students at Cal Maritime would greatly benefit from changing the existing Chemistry I into two separate Chemistry courses: one serving engineering students (General Chemistry) and one serving non-science majors (Introductory Chemistry). Both of these courses would include a laboratory co-requisite (General Chemistry Laboratory and Introductory Chemistry Laboratory, respectively). A more detailed description of the proposed courses can be found in the Chemistry Program section of this document. Students would also greatly benefit from the creation of discussion/recitation sections to accompany the lecture portion of the course.

Marine Science Curriculum
The recent environmental scan conducted for the Academy found that a bachelor's degree in Environmental Sciences would desirable degree that would lead to good employment opportunities. Based on this finding, we recommend expanding the current Marine Science Minor into a major in Marine Sciences or Oceanography. Currently, the only CSU offering a bachelor's degree in oceanography is Humboldt State University.

The location of the Academy on the shores of San Francisco Bay and the access to vessels that could be used for water sampling and oceanographic surveying gives Cal Maritime a unique opportunity to begin a marine science research program.

Mathematics Curriculum
We recommend the establishment of a Mathematics Minor. This would require two additional 3-unit courses be added to the current roster of math courses. A cadet who wishes to complete the Math Minor would be required to complete:

- MTH 210 Calculus I – 4 units
- MTH 211 Calculus II – 4 units
- MTH 212 Calculus III – 4 units
- MTH 215 Differential Equations – 4 units
- Two additional 3-unit courses.

One of the 3-unit courses which should be introduced is Linear Algebra. This class would focus on careful development of matrices in the service of solving linear systems of equations, vector spaces, linear transformations, eigenvalue/eigenvector determination, and generalization of dimension.

The other 3-unit course should be a Special Topics course whose content changes from offering to offering depending on the desires and needs of the campus. Some possible topics for such a course include Fourier Analysis, Complex Analysis, Introduction to Pure Mathematics, or Advanced topics in Engineering Mathematics.

We believe that the inclusion of a Mathematics Minor into the Sciences and Math program would be a great benefit to those students who seek a deeper understanding of the mathematics they use in their own degree program. An informal survey of ME and MET cadets reveals extensive interest in a Mathematics Minor. We believe that participation in the Minor would be high.

Math Remediation
We recognize, along with many faculty from other departments and programs, the need for high-quality math remediation for a subset of the cadets. As the Academy grows, we can expect this need to increase. Other campuses in the CSU system and many community college math programs have extensive remediation programs, sometimes consisting of up to 4 different courses.

At CMA, we currently have one class expressly designed with remediation in mind - MTH 001 Intermediate Algebra. Therefore, we recommend that the possibility of an expanded remediation program be considered.

Physics Curriculum
Curriculum changes are not expected to occur if the Physics Program does not grow. The Physics Program, however, recommends that the courses currently offered be expanded to allow students the possibility to pursue a minor in physics. This would require offering two new courses, a lower division course that includes Acoustics and Optics,

and an upper division course that introduces students to Modern Physics. A more detailed description of the courses required for a minor in physics can be found in the Physics Program section of this document.

Students would also benefit if the Program were to offer Honors Physics courses, as well as elective courses that explore topics of current interest, such as energy resources (the physics behind nuclear power, wind and solar energy, etc.) and the physics of global warming. Offering students the possibility of pursuing undergraduate research in computational physics and chemical physics would also give students a positive and lasting learning experience. The Physics Program, therefore, recommends that the current curriculum be expanded to offer

- Two additional physics courses that students would be required to take to minor in Physics
- Elective courses that explore topics of current interest (e.g. "Energy Resources for Future Captains/ Engineers", exploring the physics behind nuclear power, wind and solar energy, etc.)
- Honors Physics courses.
- Undergraduate research opportunities for students in computational physics and chemical physics.

Chemistry Faculty
The environmental scan conducted at Cal Maritime predicted a steadily increasing student population in the next few years. Therefore, the number of faculty will inevitably need to increase as the number of student needing to take Chemistry courses gets larger. If the recommended changes to the Chemistry Program are adopted, there will be no immediate need for increased faculty to accommodate the change unless the student population grows significantly and the demand for Chemistry courses increases.

Marine Science Faculty
We are in the process of conducting a nationwide search for an Assistant Professor of Oceanography. We expect this person to teach all of the marine science courses and be the lead person in developing a degree in Oceanography or Marine Sciences.

Physics Faculty
The environmental scan conducted at Cal Maritime predicted a steadily increasing student population in the next few years. Therefore, the number of faculty will inevitably need to increase as the number of student who need to take physics courses gets larger. Additionally, if the Physics Program were to grow and the recommended additional courses were to be offered, the number of faculty teaching in the Physics Program would need to increase further.

Chemistry Resources
The current level of resources would not be adequate to maintain the quality of the Chemistry Program during the next five years if the number of students that the Program needs to serve follows the growth trend predicted by the environmental scan. Laboratory facilities would need to be expanded and laboratory equipment purchased. Recommended annual budget for chemicals and supplies is $2,000.

Marine Science Resources
The current resources and equipment would need to be upgraded and expanded to support a new degree in Oceanography or Marine Sciences. The current oceanographic equipment is over 35 years old and the quantity of equipment is designed for labs with 8 or fewer students. Recommended annual budget for chemicals, supplies, and vessel rental is $1,000.

Physics Resources
The current level of resources would not be adequate to maintain the quality of the Physics Program during the next five years if the number of students that the Program needs to serve follows the growth trend predicted by the environmental scan. Laboratory facilities would need to be expanded and laboratory equipment purchased. Recommended annual budget for supplies and equipment is $2,000.

If the Physics Program were to expand following the recommendations of this self-study, laboratory equipment for new physics laboratory courses, as well as Unix-based computers, would need to be purchased. An increase in the number of faculty teaching in the Program would also require additional research and travel funds for faculty development.

Department Lab Resources
Recommended annual operating budget for lab supplies = $2,000 (chemistry) + $2,000 (physics) + $1,000 (oceanography) + $1,000 (math & computer sciences) = **$6,000**.