The Application of the Global Maritime Professional Framework on an MET Program: A Case Study

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Abstract

This paper delineates an attempt to apply the framework of the Global Maritime Professional (GMP) as it has been articulated in the *2019 Body of Knowledge* (BoK) to an existing program in order to asses that program, and also to test the navigability of the tables – to see what may be problematic, and to see how both the program and the BoK could be adapted to address the future needs of the maritime world. It was hypothesized that the Marine Transportation Program of CSUMA – embedded as it is within a very large American system of higher education with many externally-required provisions for general education and other knowledge acquisitions outside of maritime training – would align quite positively with the criteria and the levels of achievement stated in the BoK.

By describing the process of mapping an academic program onto the GMP framework it is hoped that such an endeavor will inform other institutions that are likewise engaged (or considering engagement) with this project. Furthermore, recommendations will be identified for improvement of the program under scrutiny, the mapping process, and, perhaps, the framework itself for continuous future improvement of the educational development of the maritime professional.

Keywords: Global Maritime Professional, Maritime Education and Training

1. Introduction

One of the International Association of Maritime Universities' foundational and fundamental goals was to provide a universal, coherent, international curriculum for maritime education and training. [1] The past two decades have seen several iterative but aborted attempts to deliver on this goal. A few studies are cited in the Book of Knowledge itself – "The Harmonization of European Maritime education and Training Skills (METHAR), the Thematic Network on Maritime Education, Training and Mobility of Seafarers (METNET), and The Skills and Competences Development of Future Transportation Professionals at All Levels (SKILLFUL) – but there have been several IAMU articles and presentations on this topic as well [2]. Work on this objective began to coalesce around an outcomes-based notion of what, collectively, we seek in the maritime community. Instead of focusing on the near-impossible task of aligning curricula across diverse institutions with different governing bodies and myriad local, national, and regional accrediting agencies, the orientation shifted toward identifying the characteristics of a "Global Maritime Professional." This would be "an individual who is not only equipped with all the relevant technical competencies" but also exhibits a "high level of professionalism and ethical behavior," has "high-level academic

skills," is able to "optimally work with teams and take personal initiative," and "exhibits a high sense of environmental consciousness and has an excellent grasp of contemporary issues affecting the maritime industry" [3].

The notion of re-orienting the attempt to universalize MET – moving from model courses, standardized curricula, modules, exams, etc. toward outcomes-based or competency-based educational models – is not necessarily new (see El Ashmawy, Weintrit, Benton) [4]. However, the breadth and sophistication of the model articulated in the BoK builds upon past theorizations and postulations to ultimately create something substantive and actionable. The inclusion of database tools, integrated rubrics and tables, and specific benchmarks across different cognitive, affective, and psychomotor domains is designed not to be a scholarly artifact, but a living workbook whereby maritime universities may assess and evaluate their programs against a prescribed model with a vetted methodology – something which should hopefully gain traction across all maritime institutions.

This paper delineates the attempt to apply this framework to an existing program in order to not only asses that program in light of the global parameters set forth in the Body of Knowledge, but also to test the navigability of the tables – to see what may be problematic, and to see how both the program and the BoK could be adapted to address the future needs of the maritime world. The Bachelor of Science in Marine Transportation at the California State University Maritime was assessed as a "GMP Tier B" program across the cognitive, affective, and psychomotor domains, with the understanding that other institutional programs would be assessed later. It was the hypothesis that Cal Maritime's program, because it is embedded within a very large American system of higher education with many externally-required provisions for general education and other curricular considerations outside of maritime training, would align quite positively with the criteria and the levels of achievement articulated in the BoK.

Part of the elegance and usefulness of the GMP model rests in its orientation to outcomes-based education (OBE). This, as Roy Killen notes, can be seen as a "theory or philosophy of education in the sense that it embodies and expresses a certain set of beliefs and assumptions about learning, teaching, and the system structures within these that activities take place" [5]. This involves moving away from the type of assessment based on test results and completion rates and moving toward a transformational OBE which is less tangible and "is usually expressed in terms of what students know, are able to do, or are like as a result of their education" [6]. An additional distinction of outcomes-based education is its principle of "designing back." Instead of a orientation wherein a program is constructed from course design and instructor input, "the starting point for all curriculum design [in transformational OBE] must be a clear definition of the significant learning that students are able to achieve by the end of their formal education. All instructional decisions are then made by tracing back from this "desired end result" and identifying the building blocks of learning that student must achieve in order to reach the long-term outcomes" [7]. Such a design principle circumvents the thorny and complex issue of attempting to standardized curriculum or courses or modules that fail the test of translation from one university (or country) to another. Thus, while there is slippage in the nomenclature of "outcomes-based education" and "competency-based education," the central point is to understand how this informs the GMP Book of Knowledge, and how this can work towards the implementation of a globalized platform for MET.

2. CSUMA and the Program in Marine Transportation

As noted in Section 4.3.2 of the *Global Maritime Professional Book of Knowledge*, this inaugural version "is targeted at ship operators (onboard or remote). This is in line with the criteria for membership of the IAMU. However, it is recognized that many of the member universities do not exclusively educate and train seafarers and their educational offering include a range of competencies in the maritime industry defined in wider terms than technical ship operation. It is envisaged that future version of the BoK will include and specifically address this wider scope" [8]. The California State University Maritime Academy is such an institution, with degree programs in International Business and Logistics, Facilities Engineering, Global Studies and Maritime Affairs, Oceanography, and Transportation and Engineering Management, among others. More will be said about these programs and the possibility of further editions of the BoK in the conclusion of this essay, but in line with the initial intent of the BoK, the initial program under scrutiny is Cal Maritime's bachelor's of science in Marine Transportation (MT). This major provides the broadest maritime industry training possible consistent with officer licensing requirements. Through the wide array of professional skills taught, the MT program is designed to prepare students to take the U.S. Coast Guard STCW licensing exam for Third Mate and Officer in Charge of the Navigational Watch. Passing this examination, which results in the issuance of a Third Mate's license, is essential for a student seeking employment as a licensed deck officer on a commercial vessel. Marine Transportation graduates also have a broad employment field open to them: a wide variety of shore-side management positions are available in numerous maritime sectors, including vessel operations, ship's agency, marine insurance, stevedoring, charter brokering, and federal employment.

This is the most populated major on campus, with approximately 300 enrolled students. It is also a very high-unit major, requiring 159 units to complete while the U.S. standard for a B.S. degree is 120 units (See Appendix A). One reason for the high number of units is not necessarily because of STCW requirements, but because Cal Maritime is a campus of the California State University system (CSU), a series of campuses under a Chancellor's Office that serves close to 500,000 students and is the largest comprehensive university in the country. As such, the CSU has several General Education requirements designed to complement the major program completed by each baccalaureate candidate. These requirements are designed to "provide the knowledge and perspectives that will enable CSU students to confront personal, cultural, moral and social issues that are an inevitable part of human life, and cultivate enthusiasm for lifelong learning" [9].

Additionally, the Marine Transportation program has a series of program learning outcomes, which are aligned with the institution's general education outcomes, which are then aligned with Cal Maritime's Institution Learning Outcomes. Ultimately, these correspond to the university's mission, in a triangulated hierarchical construction from the more specific to the more general. It is up to various assessment bodies on campus to ensure that students are meeting their learning outcomes on the multiple levels. (See Appendix B for MT Program SLOs and MT Gen Ed SLOs).

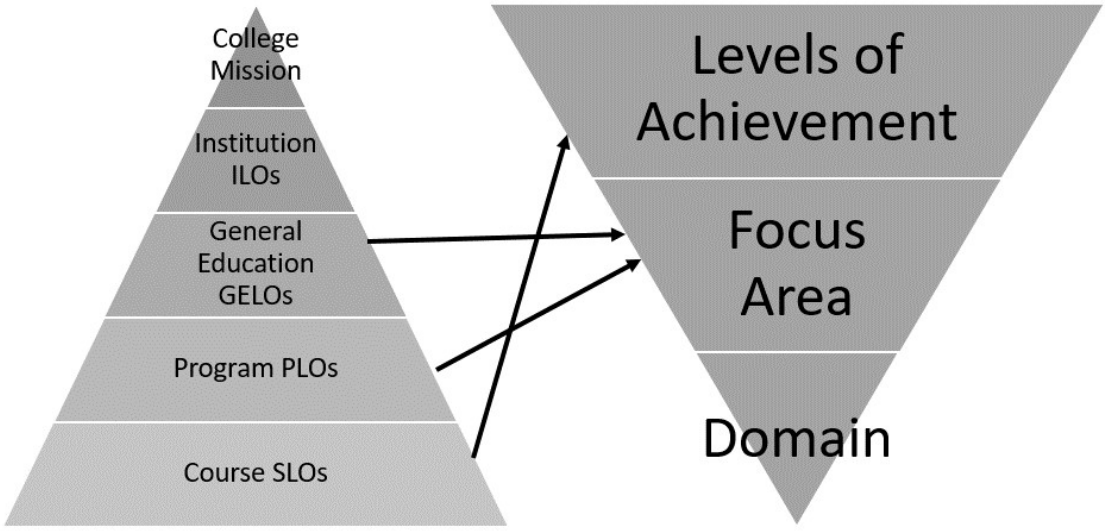

Figure 1. Learning Objectives mapped to BoK

This introductory material is presented in order to understand how the hierarchical model of learning outcomes fed into our mapping project with the BoK. At Cal Maritime, GE learning outcomes and program learning outcomes derive from a set of cohesive courses that fold up into the more generalized institution learning outcomes and ultimately, the institutional mission as displayed in the left pyramid in Figure 1. The BoK's designated levels of achievement (on the inverted pyramid on the right side of Figure 1) can only be ascertained by drilling down to the specific course outcomes that are determined by program coordinators and are assessed on the course level. The following sections will identify and analyze specific challenges we faced in navigating the BoK tables, mapping the curriculum, and ascertaining appropriate levels of achievement.

3. Navigability of the Charts

An initial problem arose when first attempting to use the proposed method of employing the tables in accordance with the implementation framework. As suggested, after selecting the appropriate GMP tier, the program administrator would move to "Related Focus Areas," select the corresponding level of achievement, and finally locate the associated "Intended Learning Outcomes." However, this led to an important question of how exactly the institution intends to use to the framework. This approach works if the intent is to see what the institution needs to do to bring its program up to the pre-determined thresholds of the specific tier. A different orientation to the assessment – which we found to be more useful – was to *begin* with the Intended Learning Outcomes, compare them to our own program learning outcomes, and then work backward through the LoAs and the Related Focus Areas. This allowed us to better see where our program met, exceeded, or failed to meet the level of achievement as determined by the framework.

While the specific tier tables in Appendix 1 of the BoK helped to alleviate this problem of navigating across domains and levels and areas, an assessor would still have to toggle between, say, Table 7 (Tier A Levels of Achievement) and Table 10 (Tier B Levels of Achievement) if the intent was to measure compliance to that higher domain level.

This issue was unfortunately reinforced by the BoK tool that was built using Microsoft Access, a database management system that combines the relational MS Jet Database Engine with a graphical user interface and software- development tools. Despite the ubiquity and global reach of Microsoft products, this is not a DBMS that is used widely at Cal Maritime: it had a somewhat clunky interface, and was not very user-friendly in extracting specific foundational or academic elements. Additionally, there was limited ability to format the data into reports to disseminate to affiliated groups on campus for curricular review and revision. Of course, this is by no means a fault of the BoK framework itself: the conclusion of this essay makes a recommendation for adopting a different technology for this particular function.

4. Curriculum Mapping of the Cognitive Domain

Perhaps a less significant observation, but in introducing the GMP framework to program coordinators and assessment committees, there was some initial confusion as to how the levels of achievement were meant to be associated with the program under observation because the language used to describe each level mirrored the language in rubrics used to assess programmatic outcomes, even though the purpose of these rubrics are quite different. For example, when looking at the mathematic focus area of the cognitive domain, to meet the level of Tier B, the program should rise to "Level 4: Analyzing" (See Figure 2)."

Table 4: Intended learning outcomes in the cognitive domain

Focus Area	*The Cognitive Domain level of achievement*					
	1 Remembering	2 Understanding	3 Applying	4 Analyzing	5 Evaluating	6 Creating
	Foundational elements					
1. **Mathematics**	**Identify** key mathematics information and **recall** equations related to academic and professional skills.	**Explain** relevant mathematical principles.	**Demonstrate** the application of mathematical principles to the solution of relevant problems	***Analyze*** *complex problems to determine relevant mathematical principles and* ***examine*** *solutions in light of this analysis.*	***Evaluate*** *the merits of using different mathematical approaches to solve problems.*	***Create*** *new knowledge/approaches in mathematics.*

Figure 2. Bok LoA for Mathematics Focus Area. [10]

In contrast, at Cal Maritime when assessing mathematics (or what we term "quantitative reasoning") a conventional rubric is used to score specific artifacts. In Figure 3 (an excerpted appendix from a Cal Maritime annual assessment report), a scale of 1-6 is used to determine students' mathematical proficiency, with a predetermined benchmark of 4 declared as meeting that particular outcome. Thus, if a subset of students based on any number of factors (major, gender, ethnicity, economic status, etc.) fails to meet the benchmark, targeted actions can be recommended for improvement. Therefore, while the language in the rubrics in Figures 3 and 4 may be similar, they are used for different purposes – one to provide data on specific groups of students in order to promote continuous improvement, and the other (in the case of the BoK tables) a more static exercise to identify a program's position in a specific hierarchy. Perhaps this was self-evident to other institutions using the BoK, but it required some reflexive work on our part.

ILO-C: "Use numerical information to identify, analyze and solve problems."

A person who is competent in quantitative reasoning possesses the skills and knowledge necessary to apply the use of logic, numbers, and mathematics to deal effectively with common problems and issues. A person who is quantitatively literate can use numerical, geometric, and measurement data and concepts, mathematical skills, and principles of mathematical reasoning to draw logical conclusions and to make well-reasoned decisions.

The benchmark for meeting this Student Learning Outcome will be a 4 or greater on this 6-point rubric.

	Initial (1-2)	Emerging (3)	Satisfactory (4)	Good (5)	Exemplary (6)
Demonstrate the ability to use numerical and/or symbolic information to identify, analyze and solve quantitative problems.	Demonstrates little or no understanding of what information and assumptions are needed to perform the analysis. Did not organize or calculate a mathematical strategy for a given situation, or did so in a completely invalid manner.	Demonstrates basic understanding of what information and assumptions are relevant to the analysis. Translation into mathematical symbols, graphs, and/or tables is flawed or incomplete. Approach and information gathering appears essentially effective, but includes major mistakes in organization or calculation	Demonstrates satisfactory understanding of what information and assumptions are relevant to the analysis, and translates into mathematical symbols, graphs, and/or tables with minor errors. Approach and information gathering appears essentially effective, but includes minor mistakes in organization or calculation	Demonstrates high level of understanding of what information and assumptions are relevant to the analysis, and correctly translate into mathematical symbols, graphs, and/or tables. Correctly organizes information in an appropriate form and calculates desired result with one minor error.	Demonstrates high level of understanding of what information and assumptions are relevant to the analysis, and correctly translate into mathematical symbols, graphs, and/or tables. Correctly organizes information in an appropriate form and calculates desired result with no errors.

Figure 3. Cal Maritime Institution-Wide Assessment Report 2019, Appendix A [11].

One additional challenge in the curricular mapping (which will be re-addressed in the "Results/Discovery" section) concerns *who* does the mapping. The BoK suggests that this should be done by "program administrators," but that term itself might not translate globally into environments that have assessment coordinators, department chairs, academic deans, etc. Different personnel with different levels of knowledge and experience with the curriculum may come to very different conclusions when determining specific levels of achievement.

5. Affective and Psychomotor Domains

While the cognitive domain is comprehensible to assessment committees and coordinators, there is much less emphasis on the Affective and Psychomotor domains for assessment and accreditation purposes. Certainly, they have relevance as derived from Bloom's taxonomy and in MET research devoted to these specific domains. However, while the cognitive domain can be mapped by a program coordinator or committee by attending to the previously existing program learning outcomes, determining the appropriate LoA in the Affective Domain in particular proves more difficult to assess, as reliable data must be primarily drawn via student self-reflexive feedback. This is an exercise that is not widely practices at Cal Maritime, and would take additional resources in time and effort to gather and analyze results. It is beyond the purview of this paper, but the issue begs the question: how are affective learning outcomes *taught* in MET programs? How are they measured? How is the body of knowledge on this topic specific to maritime education informing assessment practices of these domains?

6. Results and Discovery

As hypothesized, Cal Maritime's Marine Transportation program met most of the thresholds for a Tier B program. A few observations about the process: first, as indicated before, there may be an issue of bias with those assessing the program. The BoK suggests this to be a program coordinator who would certainly have the knowledge to make such distinctions, but a committee might be more prudent. It would be expected that if this outcomes mapping exercise was conducted blindly and independently by different faculty or administrators familiar with the program, there may be multiple and/or contradictory results. While this internal dissonance may be corrected by collaboration through committee rather than individual work, the issue is potentially exacerbated when deployed across dozens of institutions from several different nations. Concomitantly, despite the extensive descriptors, a "norming session" could help calibrate the process and provide cleaner data.

Relatedly, there is an internal bias of self-evaluation: if a program is predetermined to be a "Tier B" program, and is "supposed" to reach specific thresholds in accordance to that level, then more often than not, it "must" be at that level. Also, in our assessments there were discussions around some of the descriptors which narrowed the scope in ways which led us to question if we had achieved that level. For example, under "Contemporary Global Issues" the language in the higher plane LoAs conclude with the prepositional phrase "*in the maritime industry and practice.*" [12]. Some required classes, however, explore social, political, and cultural manifestations of globalization that have less relevance to the maritime realm, and therefore disqualify them from counting toward that threshold. Additionally, there is the issue of electives: in the Cal Maritime MT curriculum – especially in the general education segments – students are offered choices of courses in the humanities, sciences, and social sciences. Some of these would satisfy or exceed the LoA for certain elements, but others would not. For example, a marine transportation student *could* take a higher level course in logistics but doesn't necessarily have to – which leads to the idea that one could build an internal GMP roadmap to satisfy different levels. A different, tangential concern regards those classes with outcomes that don't relate to the GMP schema. Because of its status as a public, state-supported institution, Cal Maritime students are required to take courses in American history and government. Is it necessary for the BoK to acknowledge other national or regional requirements? Of should the framework be indifferent to these courses? Finally, there is a problem with verbs and taxonomy as a whole. As noted by Newton, Da Silva, and Peters, "The taxonomy is widely implemented as a hierarchy of verbs, designed to be used when writing learning outcomes, but a 2020 analysis showed that these verb lists showed no consistency between educational institutions, and thus learning outcomes that were mapped to one level of the hierarchy at one educational institution could be mapped to different levels at another institution" [13].

Cal Maritime's program fell below the expected Levels of Achievement in our first assessment of the program in the following focus areas:

- Contemporary Global Issues
- Situational Awareness, Preparedness and Response.
- Sustainable Development
- Human Resource Management
- Mentorship
- Computing and Informatics

Generally, in these categories the program fell between a level 3 and a level 4 – between "applying" and "analyzing" for focus areas that were less defined in the MT curriculum, given the reasons elucidated above.

Focus Area	*The Cognitive Domain level of achievement*					
	1 Remembering	2 Understanding	3 Applying	4 Analyzing	5 Evaluating	6 Creating
Human resource management	**Define** "human resource management" and **describe** the development of the concept from the earlier concept of "personnel management"	**Explain** the principles underpinning human resource management and **distinguish** between different techniques, activities and approaches and their relevance to a multicultural environment	**Apply** relevant human resource management theories and techniques to **achieve** goals related to own maritime professional practice	**Diagnose** the causes of ineffective human resource management and **prioritize** the actions to be taken to address problems that may arise due to poor human resource management practices	**Judge** the effectiveness of different human resource management approaches and techniques in different contexts of maritime professional practice and highlight areas that need further attention	**Develop** new human resource management techniques when conventional techniques are not suitable or not applicable.

Figure 4: CSUMA articulation to the LoA of Focus Area Human Resource Management.

Cal Maritime's program *exceeded* the expected level of Tier B in

- General humanities and social sciences
- Problem Recognition and Solving
- Environmental Awareness, Sustainability and Stewardship

These findings have to yet to be confirmed and corroborated by other stakeholders on campus, but the results show some variance in the expected levels of achievement. Further steps, in accordance with standard assessment practices, require deeper study of the underlying reasons for the variances and where they can be addressed, but also – and this is a crucial issue – *if* they should be addressed as legitimate deficiencies in a particular program.

7. Recommendations and Conclusion

The authors of the BoK clearly acknowledge the need to revise and adapt this document contingent on educational and societal changes as well as revisions necessary for it to remain relevant and applicable to MET institutions: "This Body of Knowledge is not intended to be a singular, static document, but rather a living resource that adapts and evolves so as to be a key resource for all stakeholders involved in training, developing, education, employing, and overseeing Global Maritime Professionals" [17]. In accordance with this intent, the following recommendations are suggested in the spirit of collegial collaboration.

1. Consider using a different technology for the BoK tool While other DBMSs' may be more expensive, the use of an algorithmic database that walks a reviewer through a series of questions based on the LoAs may be more effective in capturing the truer essence of a particular program.

2. A bold proposal: consider the elimination of the Affective and Psychomotor Domains, or better explain their usefulness. There is scant information in the BoK – as to why these domains are relevant and what they bring to the overall assessment of an MET program – and they may serve to muddy what is an already complicated framework. Perhaps more research on the significant of these domains is underway; if so, this should be tied back into future editions of the Bok to better explain their purpose.
3. Somewhat related to #2, if the BoK is to evolve and grow with more frameworks for non-shipboard programs– perhaps envisioning, say, even five new framework in logistics, policy, law, maritime energy and environment – this would lead to an exponential number of LoAs and even different elements under the cognitive domain alone. At what point might the tables become difficult to manage?
4. In mapping Cal Maritime's program through this framework, it became clear that such an exercise would benefit from external validation. Such a process may take the form of an IAMU Special Interest Group, or other such organization that would allow interested parties to share their experiences in modeling their programs, identify shared points of confusion or frustration, and offer insights from their own experiences that would expedite the process.
5. Finally, to put this most bluntly, at the conclusion of the exercise, what are the next steps? The initial immediate action would appear to be internal reform to redesign the program in order to comply to the appropriate tier. But after that? Should there be an external notification (akin to what this paper is trying to accomplish)? Should there be a portal by which institutions can view each others' self-identified measurements? This may be accomplished via surveys, as suggested in the BoK, but perhaps there may be a stronger and more unified repository of the collective results.

Ultimately, the Global Maritime Professional Book of Knowledge represents a quantum leap forward for MET, and the IAMU, in terms of reaching the objective of a standardized global curriculum that will enhance cooperation and collaboration amongst all member institutions. Coupled with the new scholarship program offered in partnership with the Nippon foundation, the GMP framework may prove to be a breakthrough phase in advancing the mission of the organization.

Appendix A: Marine Transportation Curriculum

STUDENTS ENTERING IN 2020 **REVISED 1/21/21**

APPENDIX A Marine Transportation Curriculum

FALL 2020

COM	100	Introduction to Computers	2.0
DL	105	Marine Survival ▶✽	1.0
DL	105L	Marine Survival Lab ▶✽	1.0
DL	105X	USCG Lifeboatman's Exam ▶✽	0.0
DL	109	Industrial Equipment and Safety✽	1.0
DL	115	Marlinspike ▶✽	1.0
FF	200	Basic/Advanced Marine Firefighting ▶[1&2]	0.0
MTH	100	College Algebra and Trigonometry (Area B4)	4.0
NAU	103	Introduction to Marine Transportation✽	3.0
NAU	104	Shipboard Security and Responsibility ▶✽	1.0
NAU	105	Ship Structure ▶✽	2.0
PE	101	Swim Competency Exam	0.0
PE	102	Beginning/Intermediate Swimming	(0.5)
		Total	**16.0**

FALL 2021

American Institutions I Elective (Area D-Lower Div) [3&4]			3.0
DL	111	Ship Operations II ▶✽	1.0
DL	225	Radar/ARPA ▶✽[1&2]	2.0
DL	225L	Radar/ARPA Lab ▶✽[1&2]	2.0
EGL	220	Critical Thinking	3.0
[Critical Thinking Elective] (Area A3) **"G4"**			
NAU	102	Navigation I ▶✽	4.0
NAU	102L	Navigation I Lab✽	0.0
NAU	230	Rules of the Road ▶✽	2.0
PHY	100	Physics I (Area B1)	3.0
PHY	100L	Physics I Lab (Area B3)	1.0
		Total	**18.0 OR 17.0**

FALL 2022

Arts Elective (Area C1-Lower Div)			3.0
Humanities Elective (Area C2-Lower Div) [1&2]			3.0
DL	301	Navigation Piloting Lab✽[1&2]	1.0
DL	310	Marine Supervisory Lab✽	1.0
EGL	300	Advanced Writing	(3.0)
NAU	302	Advanced Navigation ▶✽	3.0
NAU	302L	Advanced Navigation Lab✽	0.0
NAU	320	Tank Vessel Operations ▶✽	3.0
NAU	330	Meteorology ▶✽ (Area B-Upper Div)	3.0
NAU	335	ECDIS ▶✽[3&4]	2.0
NAU	335L	ECDIS Lab ▶✽[3&4]	1.0
		Total	**17.0 OR 16.0**

FALL 2023

Humanities Elective (Area C-Upper Div)			3.0
DL	305	Tug and Barge✽[3&4]	1.0
DL	405	Shipboard Medical ▶✽[1&2]	1.0
DL	405L	Shipboard Medical Lab ▶✽[1&2]	1.0
DL	410	Ship Handling ▶✽[1&2]	1.0
DL	420	Watchstanding Simulation ▶✽	2.0
GOV	200	American Government	3.0
[American Institutions II Elective] (Area D-Lower Div)			
HUM	400	Ethics (Area C-Upper Div)	3.0
NAU	410	License Seminar✽	2.0
NAU	410L	License Seminar Lab✽	0.0
NAU	415	Transportation Security ▶✽	2.0
		Total	**18.0 OR 16.0**

SPRING 2021

CHE	105	Introductory Chemistry (Area B1)	3.0
CHE	105L	Introductory Chemistry Lab (Area B3)	1.0
DL	100	Small Craft Operations✽	1.0
DL	110	Ship Operations I ▶✽	1.0
DL	120	Cargo Operations ▶✽	1.0
ECO	100	Macroeconomics (Area D-Lower Div)	3.0
EGL	100	English Composition (Area A2) **"G4"**	3.0
EGL	110	Speech Communication (Area A1) **"G4"**	3.0
FF	200	Basic/Advanced Marine Firefighting ▶[3&4]	0.0
NAU	110	Seamanship ▶✽	3.0
		Total	**19.0**

SPRING 2022

American Institutions I Elective (Area D-Lower Div) [1&2]			3.0
Life Science Elective (Area B2)			3.0
DL	240	GMDSS ▶✽	2.0
DL	240L	GMDSS Lab ▶✽	1.0
DL	225	Radar/ARPA ▶✽[3&4]	2.0
DL	225L	Radar/ARPA Lab ▶✽[3&4]	2.0
NAU	205	Ship Stability ▶✽ (Area B4) **"G4"**	3.0
NAU	240	Electricity/Electronics✽	3.0
NAU	240L	Electricity/Electronics Lab✽	1.0
		Total	**16.0 OR 17.0**

SPRING 2023

Humanities Elective (Area C2-Lower Div) [3&4]			3.0
DL	301	Navigation Piloting Lab✽[3&4]	1.0
DL	311	Marine Management Lab✽	1.0
DL	320	Introduction to Bridge Simulation ▶✽	2.0
NAU	120	Marine Engineering✽	3.0
NAU	300	Celestial Navigation✽	4.0
NAU	300L	Celestial Navigation Lab✽	0.0
NAU	325	Cargo Vessel Operations ▶✽	3.0
NAU	335	ECDIS ▶✽[1&2]	2.0
NAU	335L	ECDIS Lab ▶✽[1&2]	1.0
		Total	**16.0 OR 17.0**

SPRING 2024

Social Science Elective (Area D-Upper Div)			3.0
DL	305	Tug and Barge✽[1&2]	1.0
DL	405	Shipboard Medical ▶✽[3&4]	1.0
DL	405L	Shipboard Medical Lab ▶✽[3&4]	1.0
DL	410	Ship Handling ▶✽[3&4]	1.0
LAW	315	Admiralty Law	2.0
MGT	310	Port and Terminal Management	3.0
NAU	400	Advanced Maritime Topics✽ **CHOOSE THIS**	3.0
NAU	420	Maritime Casualty Seminar✽ **OR THIS**	3.0
NAU	430	Liquefied Gas Cargos✽ **OR BOTH OF**	2.0
NAU	430L	Liquefied Gas Cargos Lab✽ **THESE**	1.0
NAU	435	Marine Transportation: People, Planet and the Profession - MT Capstone✽	3.0
		Total	**15.0 OR 17.0**

SUMMER CRUISE 2021

CRU	100 Sea Training (Deck) ▶	8.0
	Total	**8.0**

SUMMER CRUISE 2022

CRU	200 Sea Training II (Deck)	5.0
CRU	200L Sea Training II Lab (Deck)	3.0
	Total	**8.0**

SUMMER CRUISE 2023

CRU	300 Sea Training III (Deck) ▶	8.0
	Total	**8.0**

THIRD MATE'S/OICNW LICENSE REQUIRED FOR GRADUATION

CSU Writing Proficiency Requirements may be met by passing the Graduate Writing Exam, or passing EGL 300 Advanced Writing.

[1&2] Divisions 1&2 take course
[3&4] Divisions 3&4 take course

"G4" "Golden 4" Courses (Must receive a "C-" or higher)
▶ STCW Courses (Must receive a "C-" or higher, or "CR")
✽ Required Courses in Major (CGPA = 2.0 is required)

NOTE: Course content/curriculum may be modified to meet STCW or other regulatory requirements.

Appendix 2: Program and General Education Learning Outcomes

Marine Transportation Program Student Learning Outcomes	
MT PLO 1: Discipline-Specific Knowledge	Graduates will demonstrate competence in the concepts and technologies of international marine transportation
MT PLO 2: Leadership and Teamwork:	Graduates will demonstrate the ability to work effectively as a leader and member in professional teams
MT PLO 3: Communication	Graduates will demonstrate effective communication skills
MT PLO 4: Ethical Awareness	Graduates will use ethical reasoning to make decisions related to the maritime industry
MT PLO 5: Quantitative Reasoning:	Graduates will demonstrate the ability to analyze numerical data.
MT PLO 6: Information Fluency	Graduates will define a specific need for information; then locate, evaluate, and apply the needed information
MT PLO 7: Critical and Creative Thinking	Graduates will analyze problems in new and different ways
General Education Learning Outcomes	
English Language Communication and Critical Thinking Outcomes	GELO 1: Demonstrate proficiency in oral communication in English, examining communication from the rhetorical perspective and practicing reasoning and advocacy, organization, and accuracy.
	GELO 2: Demonstrate proficiency in written communication in English, examining communication from the rhetorical perspective and practicing reasoning and advocacy, organization, and accuracy.
	GELO 3: Demonstrate ability to analyze, criticize, and advocate ideas; to reason inductively and deductively; and to reach well-supported conclusions.
Scientific Inquiry and Quantitative Reasoning Outcomes	GELO 4: Apply scientific principles and the scientific method to data about both living and non-living systems.
	GELO 5: Demonstrate ability to reason quantitatively.
	GELO 6: Explain and apply mathematical or quantitative reasoning concepts to solve problems.
Arts and Humanities Outcomes	GELO 7: Evaluate aesthetic experiences subjectively as well as objectively.
	GELO 8: Demonstrate awareness of the relation between the arts [C1] and their cultural contexts.
	GELO 9: Demonstrate awareness of the relation between literary and philosophical texts [C2] and their cultural contexts.
Social Sciences Outcomes	GELO 10: Identify and explain the links between human social, political and economic institutions and behavior.
	GELO 11: Analyze social problems and issues in their contemporary as well as historical settings and in a variety of cultural contexts.
	GELO 12: Explore the principles, methodologies, value systems and ethics employed in social scientific inquiry.
Lifelong Learning and Self-Development	GELO 13: Demonstrates ability to pursue knowledge and solve problems independently.
	GELO 14: Applies knowledge and skills from one context to another.
	GELO 15: Identify, access, and evaluate appropriate sources of information.

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