

Ship as a City: The Use of Standards to Design, Build, and Operate Marine Vehicles

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Project Objective

To develop tools that enhance the understanding of the integral role of standards, rules, and regulations in the design, construction, and operation of marine vehicles.



Project Goals

To create course material for incorporation into:

- Graduate and Undergraduate level curricula for maritime technical programs (both marine engineering and naval architecture) and capstone projects,
- Undergraduate level curricula for maritime license programs (both Deck and Engine Licenses), and
- Non-degree technical programs for both licensed and unlicensed mariners.



Project Importance

- Academia:
 - Improves the knowledge of students entering the marine field of the incredible influence that developed standards, rules, and regulations have on the design, construction, and operation of marine vehicles globally.
 - Provides guidance and references for student capstone projects (senior year project)
 - Serves as a valuable reference source throughout their college-level education.
- Industry:
 - Provides a foundational knowledge of this aspect of the industry, which will serve the graduates when they join the marine industry.
 - Reinforces the mindset that most decisions made in marine vehicle design, construction, and operations must include consideration of existing standards and requirements.
 - Provides training resources for professionals transitioning into the marine industry.

Project Deliverables

The materials produced focus on the following subject areas:

- **Standards and the Maritime Industry:** What standards are used in marine vehicle design, construction, and operations, and why and how are standards developed in the maritime industry?
- **The U.S. Commercial Maritime Industry:** Commercial marine vehicle specifications, national and international maritime regulations, and the classification and compliance verification process.
- **The U.S. Government Shipbuilding Industry:** Government combatant and non-combatant ship and small craft specifications and standards, national and international requirements, and classification variations for Government assets.
- **Applying a Standardization Process to Innovation:** Applying standards to innovation and new technology.



Project Deliverables (con't)

The program modules are assigned to five categories.

- **Ship as a City Introduction**
 - Ship as a City Introduction Video
 - Program Introduction (18 Slides)
 - Standards, Codes, Specifications, and Regulations (20 Slides)
- **Standards and the Maritime Industry**
 - Standards in the Maritime Industry (42 Slides)
 - Introduction to the Maritime Regulations (47 slides)
 - Sources of Standards and Regulations in the Maritime Industry (51 Slides)
- **The U.S. Commercial Maritime Industry**
 - The U.S. Commercial Maritime Industry (54 Slides)
 - Commercial Ship Lifecycle and Standards (19 Slides)
- **The U.S. Government Shipbuilding Industry**
 - The U.S. Government Shipbuilding Industry (69 Slides)
- **Applying a Standardization Process to Innovation**
 - Applying a Standardization Process to Innovation (36 Slides)
 - The Future of the Maritime Industry & Decarbonization (80 Slides)



Academic Program Incorporation

The materials developed in this project are being incorporated into the following courses in Webb Institute's undergraduate naval architecture and marine engineering program:

Course Name	Description	Academic Level	Module(s) Used
Introduction to Naval Architecture	Introductory course introducing students to topics in naval architecture	First Year	1. Introduction to the Maritime Industry 2. The U.S. Commercial Maritime Industry 3. The U.S. Government Shipbuilding Industry
Marine Engineering Auxiliary Systems and Components	Course presents the fundamentals of system components and auxiliary shipboard systems	Second Year	1. Applying a Standardization Process to Innovation
Ship Structures	Engineering course focused on modern ship structural analysis and design techniques	Third Year	1. Standards, Codes, Specifications, and Regulations
Ship Design 1	Introduction to ship design culminating in a concept ship design	Third Year	1. Standards in the Maritime Industry 2. Sources of Standards and Regulations in the Maritime
Marine Transportation	Exploration of the working of the modern marine transportation industry	Fourth Year	1. Commercial Ship Lifecycle and Standards 2. The Future of the Maritime Industry & Decarbonization



Dissemination of Project Deliverables

- Project deliverables are available to the public free of charge via a webpage accessible from Webb Institute's webpage - <https://www.webb.edu/ship-as-a-city-standards-in-the-maritime-industry/>.
- Editable versions of materials are provided on request.
- Deliverables were provided directly to:
 - Faculty advisors of the 41 student sections of the Society of Naval Architects and Marine Engineers (SNAME) – academic institutions include:
 - United States Coast Guard Academy
 - United States Merchant Marine Academy
 - State Maritime Academies – ME, MA, NY, CA
 - Universities – MIT, Michigan, Virginia Tech, New Orleans, Stevens Institute, and many more
 - Faculty in the University of Michigan's Naval Architecture and Marine Engineering Department
 - The Office of the Assistant Secretary of the Navy for the Development and Acquisition.



Lessons Learned

- Preference for à la carte modules over fixed modules
 - Less value placed on recorded lectures or content
 - Desire for editable versions of course modules
 - Different academic tracks placed different weights on individual modules
- The language used in discussing regulations, rules, and standards is often muddled in marine industry references and the industry vernacular.
 - Care had to be taken to avoid confusion creeping into the modules – student perspective
- Standards nested in international and national regulations as well as in industry rules
 - Connections and interrelations needed to be clearly identified
- Industry is interested in the content for educating professionals transitioning into the marine industry.
 - Value for professional education



Next Steps

- SNAME Annual Maritime Convention – October 2025, Norfolk, VA
 - Meet with education cohort
 - to solicit feedback on deliverables and their usage at various programs
 - to identify the demand signal for additional content
 - Address topics identified in these discussions
- Record lectures based on the deliverables
 - Will be uploaded to the website
 - Provide resources for the public's education
 - Provide resources for flipped classrooms
- Develop a professional education course based on the materials developed
 - Support professionals transitioning into the marine industry from other industries
 - Provide early career professionals in the marine industry the opportunity to enhance their knowledge base.



Thank You



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Sources of Requirements on Marine Platform Design, Construction, and Operation

Owner

Classification Societies

Regulatory Bodies

- International
- Flag State
- Port State

Industry Groups – e.g., Oil Companies International Marine Forum (OCIMF)

Charterers

Financial Institutions – Banks, Investors, Insurance Providers