



Naval Construction and Engineering
Ship Design and Technology Symposium
Thursday, April 29, 2021

Virtual (MS Teams)

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| 0800 - 0810 | Welcome and Opening Remarks <ul style="list-style-type: none">- CAPT Rob Bebermeyer, Director Naval Construction and Engineering |
| 0810 – 0830 | Student Conversion Project Brief 1 <ul style="list-style-type: none">- DDG to DD(A) Design Conversion: LT Christopher Hein, LT Christopher Reynolds |
| 0830 – 0850 | Student Conversion Project Brief 2 <ul style="list-style-type: none">- Marine Vessel to Minelaying Conversion: LT Nathan Maxwell, LT Matthew Valcourt, LT Kelli Waterman |
| 0850 – 0910 | Student Conversion Project Brief 3 <ul style="list-style-type: none">- Cruise Ship to Hospital Ship Conversion: LT Elliot Collins, LT Megan Hagen, LT Joshua Malone |
| 0910 – 0930 | Student Conversion Project Brief 4 <ul style="list-style-type: none">- Articulate Tug Barge to Unmanned Naval Logistics Platform Conversion: LT Dayne Howard, LT Scott Oberst |
| 0930 – 0950 | Research Brief: Prof Nicholas Makris <ul style="list-style-type: none">- Floating City Project |
| 0950 – 1000 | Break |
| 1000 - 1030 | Keynote Address
RDML Casey Moton, Program Executive Officer, Unmanned & Small Combatants (PEO USC) |
| 1030 – 1050 | Research Brief: Prof John Carroll and Prof Themis Sapsis <ul style="list-style-type: none">- Naval Surface Ship Maintenance: An Unconventional Approach to Improve Performance: LT Darien Sears |
| 1050– 1110 | Research Brief: Prof Themis Sapsis and Prof William Foley <ul style="list-style-type: none">- Hydrodynamic Interactions of an Unmanned Underwater Vehicle operating in proximity to a moving Submarine: LT Brady Hammond |
| 1110 – 1135 | Student Design Project Brief 1 <ul style="list-style-type: none">- Yukon Equipment Transport Initiative (YETI): LT Brady Hammond, LT Emily Mellin, LT Andy Musselwhite |
| 1135 – 1200 | Student Design Project Brief 2 <ul style="list-style-type: none">- Forward Operating Rapid Deployment (FORD) Vessel: LT Andrew Roley, LT Alexander Scott, LT Darien Sears |
| 1200 – 1225 | Student Design Project Brief 3 <ul style="list-style-type: none">- Conventionally Powered Submarine (TRITEIA): LT Georgios Fardelas, LT Timothy Fountain, LT Matthew Hait |
| 1225 – 1230 | Wrap-Up and Concluding Remarks |

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History

In August 1897, the Chief Naval Constructor, Commodore Hichborn requested Massachusetts Institute of Technology to develop and offer a three-year course of study for the professional training of naval constructors. MIT cordially responded to this request and a course of study was agreed upon. The three years of work were designated as the Junior, Senior, and Graduate years. Successful completion of the course led to the Master of Science degree. In 1901, three graduates of the U.S. Naval Academy, Ensigns Ferguson, McEntee and Spilman, began the course of study under the direction of Professor William Hovgaard.

An 1877 graduate of the Danish Naval Academy in Copenhagen, Hovgaard served in the Danish Royal Navy until 1883 when he was sent to the Royal Naval College in Greenwich, England, to study warship construction. He graduated from its three-year course in 1886 and the next year published his first naval book, "Submarine Boats." In 1901, as a Commander in the Danish Navy, he came to the United States to continue his study of the submarine and was induced by the Secretary of the Navy, John D. Long, to take charge of the new course for naval constructors at MIT. Professor Hovgaard resigned from the Danish Navy as a Captain in 1905. He was head of the new course, designated XIII-A, until 1933 when he retired as a Professor Emeritus. During his years as head of course XIII-A, Professor Hovgaard taught hundreds of naval officers and authored several widely-used textbooks.

The Naval Academy graduates sent to MIT for the course officially were attached to the Navy Yard in Charlestown and were registered as regular MIT students. The faculty maintained close relations with the chief constructor in Washington and with the constructors and top civilian staff at the Navy Yard and Fore River Ship and Engine Company in Quincy. This served two purposes: the instruction at MIT was being adapted to the needs of the service, and the faculty could use the work under construction at both yards to illustrate the classroom instruction. The course schedule was arranged to permit the students to spend one afternoon a week at the Navy Yard.

The course for naval constructors differed from the regular course XIII studies in that it was more intensive, more advanced, and was focused on warship design. A feature of the course, presented from the beginning, was that it fully immersed students in the various subjects not only with lectures, but with projects and practical assignments designed to provide hands-on experience in drawing, machine tool work, and laboratories.

Since 1910, instructors in the XIII-A curriculum have also been commissioned U.S. Navy officers. The first, Professor Henry H. W. Keith, with course XIII-A from 1910-1945, was commissioned a Lieutenant Commander in the Corps of Naval Constructors during WWI. Instructor Harold Larner (1916-1917) also held a naval commission and retired as a Captain. From 1910-1945, Course XIII-A relied on long-term instructors such as Professors Hovgaard (Captain, Danish Navy, 1901-1933), Keith (Captain, USN, 1910-1945), and Rossell (Captain, USN, 1931-1946) to lead the naval construction program. In 1945, the Navy's Bureau of Ships inaugurated the practice of detailing two active duty officers as professors for relatively short terms (2-3 years). At any given time, one officer would be a trained and experienced naval architect and the other a naval engineer.

In January of 2005, the Department of Ocean Engineering merged with the Department of Mechanical Engineering. The Naval Construction and Engineering Program, formerly called XIII-A, is now Course 2N in the Center for Ocean Engineering, Department of Mechanical Engineering

MIT Naval Construction and Engineering Program Description

The graduate program in Naval Construction and Engineering is intended for active duty officers in the U.S. Navy, U.S. Coast Guard and foreign navies who have been designated for specialization in the design, construction and repair of naval ships. The curriculum prepares Navy, Coast Guard and foreign officers for careers in ship design and construction and is sponsored by Commander, Naval Sea Systems Command. Besides providing the officers a comprehensive education in naval engineering, we emphasize their future roles as advocates for innovation in ship design and acquisition. All officers write a thesis and we endeavor to direct them toward research that supports the needs of the Navy or the Coast Guard. The course of study consists of either a two-year program, which leads to a Master of Science degree in Naval Architecture and Marine Engineering, or a three-year program, which leads to the degree of Naval Engineer.

The principal objective of both the two and three-year programs is to provide a broad, graduate level technical education for a career as a professional Naval Engineer with ship orientation. In addition to concentrating on hydrodynamics, structures and design, the curricula of both programs provide an appreciation for total ship engineering in a manner not covered in mechanical, electrical, structural, nor nuclear engineering. This approach provides an academic background for individuals who will later occupy positions of influence and actively participate in the concept formulation, acquisition, construction/modernization, design, maintenance, or industrial support of large-scale ship system programs.

The curriculum emphasizes ship design through a sequence of five subjects. "Projects in New Construction Naval Ship Design" is the last in the sequence of subjects in naval ship design at MIT. This ship design project, along with the graduate thesis, represents the culmination of the three-year Naval Construction and Engineering Program. The ship design project provides each student with the opportunity to develop an original concept design of a naval ship. The project begins during their third summer, continues through the Fall semester and Independent Activities Period and completes in their final Spring semester. The major objectives of the project include: (a) application of their naval architecture and ship design education in a complete concept design process; (b) application of their MIT technical education to at least one area of detailed engineering in this project (e. g., structures, hydrodynamics, signatures); (c) contribution to existing MIT Center for Ocean Engineering design tools; (d) application of at least one new technology and assistance in answering design questions for sponsors. These objectives are the basis for specifying requirements and planning individual projects.

There are two active-duty Engineering Duty Officer Faculty for the Naval Construction and Engineering program and officers from the U.S., Hellenic, Israeli, Turkish and Canadian navies, and U.S. Coast Guard in the program. Officer students are admitted, and Navy faculty members are appointed, through normal MIT procedures. The program is a model of voluntary collaboration for the mutual benefit of MIT and the Navy.