

Naval Architecture



Marine Engineering Graduate Program Brochure



2011-2012

The University of Michigan

Naval Architecture and Marine Engineering

More than 70% of our planet is covered by water. The earth's oceans, rivers, lakes, and their coastal margins are all part of what we call the marine environment. In the Department of Naval Architecture & Marine Engineering (NA&ME), at the University of Michigan, students learn how to design ships and various systems for this demanding and often harsh environment. In addition to the more traditional disciplines of naval architecture and marine engineering, we offer courses in offshore engineering and coastal engineering. Graduates of our program have designed vessels of all types, including naval ships, ocean-going commercial ships, submersibles, high-speed vessels, and recreational craft. A number of our alumni have played leading roles in the design of America's Cup racing yachts.

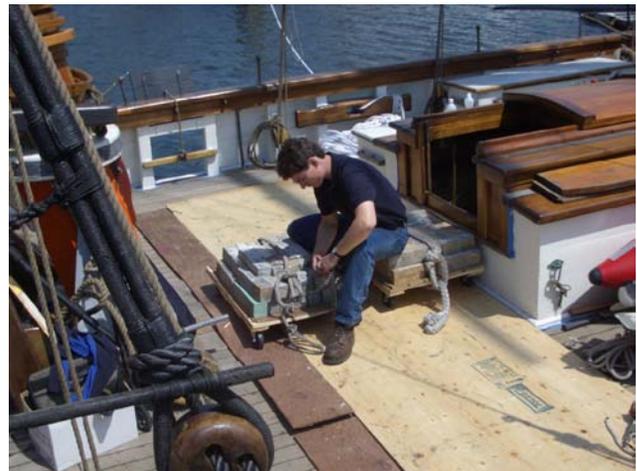
The Department of Naval Architecture and Marine Engineering graduates approximately 40% of the engineers in the field. Thus, our graduates are highly sought by employers and enjoy the benefits of a strong network of fellow alumni.

Faculty--The NA&ME faculty are a group of distinguished leaders in their fields of research who support the following:

- A comprehensive B.S.E. curriculum, which is continually being evaluated and improved to provide leadership in the field.
- Comprehensive graduate education programs, at the MS/MSE, Ph.D. levels. There are two areas of focus and excellence: Marine Mechanics, and Marine Systems Design.
- Master of Engineering in Marine Systems Design, a practice-oriented graduate degree.
- Service to the profession and strong leadership in technical and planning committees, and journal editorial boards.

Although our faculty members are very involved in research, both nationally and internationally, and have won numerous

awards, we have made it clear in our mission statement that our top priority is supporting the curriculum and making sure ours remains the top program in the U.S.A. The faculty enthusiastically introduces and incorporates new techniques when deemed appropriate and greater student sophistication and capabilities are the result. Faculty research and expertise are further enhanced by the constant arrivals and departures of visiting scholars and professors from industry and peer institutions throughout the world.



Johan Kemnitz at his internship with JMS Naval Architects in Groton, CT. Johan is helping with inclining tests on two vessels: The Boston Duck Tours (amphibious truck), and the replica of the schooner Amistad. The Amistad is getting ready to do a trip around the Atlantic Ocean, serving as a floating museum for the story of the freed slaves. JMS were there to perform inclining tests for the necessary Coast Guard certifications.

THE COLLEGE OF ENGINEERING AT THE UNIVERSITY OF MICHIGAN

The University of Michigan, one of the oldest public institutions in the country, was founded in 1817 in Detroit and moved to Ann Arbor in 1837. The University comprises 19 schools and colleges and the quality of its academic programs places it among the top ten colleges and universities in the United States.

The University has a reputation for athletic as well as academic excellence, fielding intercollegiate teams in all major sports. In addition to varsity sports, there are club teams such as soccer, rugby, judo, crew, and water polo. An outstanding intramural athletics program offers everything from team play in a variety of sports to the use of excellent

recreational facilities. To learn more about the University of Michigan, browse the Web site at <http://www.umich.edu/>.

The University of Michigan began educating engineers in 1854. Today, The College of Engineering is consistently ranked among the top engineering schools in the United States. Most of its degree programs are rated in the top ten nationwide.



Weiwei Yu, interning at ExxonMobil

The College is located in U-M's 850-acre "North Campus" and includes 18 buildings. The College shares North Campus with the Schools of Information, Music, Architecture and Urban Planning, and Art and Design, which makes for a vibrant and rich campus community.

The College's world-class facilities include more than 150 research laboratories, and our teaching and research facilities are among the most modern in the world, with continual efforts to upgrade and expand them. The library collections of the College of Engineering are located in the Duderstadt Center, a 255,000 square-foot integrated technology instruction center that offers high tech resources. The Media Union has network connectivity and contains the most advanced networking technologies available today.

THE ANN ARBOR COMMUNITY

Rated as one of the most livable communities in the United States, Ann Arbor is unique in combining many of the cultural advantages of a large city with the uncrowded, quiet

atmosphere of a small town. The University of Michigan is located right in the middle of Ann Arbor and there are no formal boundaries between the campus and the community. The downtown area is a shopping and business district that is easily accessible on foot, by bicycle, or by bus. The city has its own bus system, newspaper, general aviation airport, community access television stations, and radio stations. In addition, it serves as the Washtenaw County seat, and boasts an active political arena.

The diversity of people at the University makes Ann Arbor a distinctly cosmopolitan place to live. The social, cultural, intellectual, and aesthetic aspects of Ann Arbor mix old and new, conservative and liberal, conventional and experimental.

Entertainment and nightlife in Ann Arbor includes much theater and music. The annual Ann Arbor Art Fair in July draws visitors and artists from all over the world. For an evening on the town, Ann Arbor offers an incredible selection of restaurants with a variety of menus and cuisines. You can learn more about Ann Arbor by browsing the Ann Arbor Web site at <http://www.ann Arbor.org>

For additional information please contact:

***Graduate Program Coordinator
(734) 936-0566
NAME-Grad-Apps@umich.edu
University of Michigan
Department of NA&ME
2600 Draper Road
Ann Arbor, MI 48109-2145***

*The Regents of the University of Michigan:
David A. Brandon, Ann Arbor; Laurence B. Deitch, Bingham Farms; Olivia P. Maynard, Goodrich; Rebecca McGowan, Ann Arbor; Andrea Fischer Newman, Ann Arbor; Andrew C. Richner, Grosse Pointe Park; S. Martin Taylor, Grosse Pointe Farms; Katherine E. White, Ann Arbor; Mary Sue Coleman, ex officio*

A Brief History

In 1879, Congress authorized the U.S. Navy to assign officers to engineering. Mortimer E. Cooley, a graduate of the first four-year engineering officer program at the U.S. Naval Academy (1874-78) was detailed to serve as Professor of Steam Engineering and Iron Shipbuilding at the University of Michigan.



Mortimer Cooley

Cooley arrived in Ann Arbor in August 1881 at the age of 26 and at the time, was the only mechanical engineer in the state of Michigan. With an enrollment of 25 out of a total of 1,500 students, engineering was a minor branch of the Department of Literature, Science, and the Arts. In 1885, Cooley resigned his naval commission and accepted a permanent University faculty position. In 1899, a curriculum was established in naval architecture and marine engineering. Herbert C. Sadler arrived in 1900 to teach naval architecture while Cooley taught marine engineering. Cooley was appointed Dean of Engineering in 1904 and held that position until his retirement in 1928. Sadler became the first chair of the Department of Naval Architecture and Marine Engineering and in 1928 succeeded Mortimer Cooley as Dean of the College of Engineering. In 1903, Sadler supervised the design and construction of the towing tank in the new West Engineering Building, making Michigan the first educational institution in the world with such a research facility. During World War II, the department was able to put forth a massive effort and became an important center of war-related activities, both in research and education, and provided a valuable experimental facility and a program for



First Engineering Building, 1882

rapidly developing the trained engineers needed to support shipbuilding and ship repair efforts. The Cold War and the Soviet space challenge brought about renewed interest in research and advanced technology. During this same period, the development of international commerce brought with it an extraordinary demand for merchant shipping. The department responded and with climbing enrollment and additional faculty, graduated its first Ph.D. student in 1960. In the mid-1970s, the department moved to a modern building on North Campus where it currently resides.



Naval Architecture and Marine Engineering Bldg.

From its beginning until the present day, the Department of Naval Architecture and Marine Engineering has held a premier position in education for the marine environment and continues to explore new research and technology in preparing its discipline's future engineers.

Admission Requirements

Admission to the graduate programs is granted to students who have a successful record of achievement in their previous studies and show a strong potential to succeed in studies at the advanced level. For any of the degree programs, a complete application will include an official transcript from all post-secondary programs, and a statement of purpose. GRE scores are not normally required for M.S.E. or M.S. applicants unless the applicant wishes to be considered for financial aid. However, all Ph.D. applicants are required to complete the GRE, achieving a cumulative minimum score of 1200 on the Quantitative and Verbal segments with a 4.0 on the Writing segment. For international applicants, English proficiency must be indicated by a minimum score of 560 on the TOEFL paper test (220 on the computer-based test) or 80 on the MELAB.



Student field trip on the Lake Express from Muskegon, MI to Milwaukee, WI

Master of Science

Applicants for the M.S.E. or M.S. degrees normally hold a Bachelor of Science degree in naval architecture and marine engineering with an average grade of 3.5 on a 4.0 scale. However, the graduate program has been structured so that students with a bachelor's degree in other engineering disciplines that require knowledge of basic mechanics such

as mechanical engineering, applied mechanics, aerospace or civil engineering may also start directly on their master's program. Students with a bachelor's degree from another field without knowledge of basic mechanics and only want to pursue a master's degree will be required to take NA 470 (Foundation of Ship Design) or NA 491 (Marine Engineering Laboratory I) they will also need to take several undergraduate-level courses which will be determined on a case-by-case basis. Applicants to this program should complete the Rackham application and follow instructions contained therein.



Xiaoyan Yan is working at Technip USA. She had this picture taken at the yard near Corpus Christi, Texas. The company organized a trip to see the Tahiti spar that has been just completed.

Joint M.S.E. (NAME) / M.B.A. degree

The department offers through the Rackham School of Graduate Studies a joint degree program with the University of Michigan Business School leading to both the M.B.A. and M.S.E. degrees. The M.S.E./M.B.A. is designed to equip graduates with the business and technical background necessary to enable them to undertake responsible management roles in the marine industry. The program is arranged so that requirements for both degrees can be

completed within two and one-half years. Successful applicants must apply to and be admitted by both programs, using their respective application forms. Both submittals should indicate that application is being made to the joint program.



M-ROVER being lowered into Lake Michigan.



Kevin Morath is working for Chevron Shipping. This picture is from his trip aboard the M/T Sirius Voyager which is a Chevron-operated 1.15 million barrel oil tanker. On this trip he was six days at sea; left from San Francisco Bay, went down to an area between LA and San Diego, met with the TI Africa, a V-plus 3.2 million barrel, 441,000 dwt tanker, and transferred 700,000 barrels of oil onto the Chevron ship. This process is called Lightering. They then returned to SF Bay and anchored to await offloading at the Chevron Richmond refinery.

Doctor of Philosophy

Applicants for the Ph.D. degree will most likely already earned a master's degree. Admission procedures are the same as for the Master of Science in Engineering degree program. A student becomes a pre-candidate upon admission. No assurance is given that the student may advance to candidate status until evidence is given of superior scholarship ability. Applicants to this program should complete the Rackham School of Graduate Studies application and follow instructions contained therein.

Master of Science

(M.S or M.S.E)

Graduate students in the Master of Science degree program may choose from two options to fulfill degree requirements: a traditional course work option (**MSE degree**) or a master's thesis option (**MS degree**).

30 credit hours minimum required for the program to include:

- 6 - 8 credits** 2 Cognate Courses - must include one (1) Mathematics Course
- 18 credits** A minimum of 18 credit hours of NAME courses; **16 credits** of which are **500 level or above** from the selected course list (see below)
 - For **M.S** Students - **6** of the 18 credits need to be **NA 592** Research Thesis (6 Credits)
- 4 - 6 credits** Additional approved coursework

Selected courses:

- NA 510** Marine Structural Mechanics
- NA 520** Wave Loads on Ships and Offshore Structures
- NA 531** Adaptive Control
- NA 540** Marine Dynamics III
- NA 550** Ocean Engineering Analysis II
- NA 562** Marine System Production Business Strategy and Operations Management
- NA 570** Advanced Marine Design
- NA 580** Optimization, Market Forecasts and Management of Marine Systems
- NA 582** Reliability and Safety of Marine Systems
- NA 568** Introduction to Probabilistic Mobile Robotics
- NA 620** Computational Fluid Dynamics for Marine Design

M.S.Program - The **Thesis** option is available to students who wish to include a research experience as part of their graduate program. A **6 credit hour, written research thesis** under the supervision of and approved by at least one NAME faculty is required as part of the 18 credits in Naval Architecture and Marine Engineering.

Joint M.S.E. (NAME) / M.B.A. Degree

In addition to the Master of Science degree requirements, students must also complete:

- **31.5 credits of M.B.A.** core courses
- **13.5 credits** of elective courses in **Business Administration**

Qualified students can finish the joint program with as few as 63 credit hours.

Doctor of Philosophy

(PhD)

Minimum requirements for the PhD program include:

- **50** graduate credit classroom hours (During MS and/or PhD)
- With approved **MS** this will drop down to **20** classroom hours
- **18** credits for research (2 terms NA 995 - Candidacy)
- 3 Math Courses (During MS and/or PhD)

Maximum of 3 credit hours of Independent Study can be included in the class- room hours (exceptions: Master's Thesis are counted in full)

To become a CANDIDATE, the student must successfully complete:

Part I – written closed book exams in three areas -- Mathematics and choice of two (2) from the following:

- Structures
- Hydrodynamics
- Rigid Body Dynamics
- Environmental Fluid Dynamics
- Probabilistic Methods
- Control and Feedback Dynamics

The Part I Qualifying Exams are taken in the second term of the MS degree. When finished with Part I, student will enroll in PhD Program (Only with Advisor)

Formation of Dissertation Committee

Part II - Research prospectus presentation and oral exam

- **Open session - 30 minutes**
(25 minute - oral presentation of the research prospectus with 5 minutes -for questions).
 - The Prospectus write-up has a page limit of 10-30 pages.
 - Schedule Pre-Prospectus meeting, to discuss the questions that will be asked during oral presentation.
- **Closed session - 90 minutes** (with dissertation committee and the candidate)
 - The committee members will ask detailed questions about the prospectus and proposed thesis area.
 - Both the open and closed sessions will be graded by each dissertation committee member. The committee will meet to determine final Pass/Fail for each session. A student may pass one session and have to repeat the other. There will be one opportunity to repeat within a two month period.

Note: Under normal circumstances a student is expected to pass the Part I exam within 1 ½ years of starting your graduate studies at the University of Michigan. Candidacy should be achieved within 1 ½ years of passing the Part I exams.

⚓ **Complete Semi-annual progress reviews with candidate's dissertation committee**

The review will include a 20 minute formal progress presentation and evaluation forms signed by the committee members and the student. The 20 minute formal progress report will be open to the public and announced by email.

⚓ **Complete PhD Thesis**

⚓ **Verbally present and defend Thesis**

NA&ME Faculty



[Robert F. Beck](#)

Richard B. Couch Professor of Naval Architecture and Marine Engineering

Naval Architecture and Marine Engineering

209 NAME Bldg., 734-764-0282

rbeck@umich.edu



[Klaus-Peter Beier](#)

Research Scientist Emeritus

Naval Architecture and Marine Engineering

117 NAME Bldg., 734-764-4296

beier@umich.edu



[Harry Benford](#)

Professor Emeritus of Naval Architecture and Marine Engineering

harben@umich.edu



[Michael M. Bernitsas](#)

Professor and Undergraduate Program Chair

Mortimer E. Cooley Collegiate Professor of Naval Architecture and Marine Engineering

Joint Appointment with Mechanical Engineering

212 NAME Bldg., 734-764-9317

michaelb@umich.edu



[Howard M. Bunch](#)

Professor Emeritus of Ship Production Science

Research Scientist Emeritus

117 NAME Bldg., 734-764-6503

hbunch@umich.edu



[Steven L. Ceccio](#)

Professor Mechanical Engineering and NAME Department Chair

Joint appointment with Naval Architecture and Marine

Engineering

215 NAME Bldg., 734-936-0433

ceccio@umich.edu



[Matthew Collette](#)

Assistant Professor

Naval Architecture and Marine Engineering

210 NAME Bldg., 734-764-8422

mdcoll@umich.edu



[David R. Dowling](#)

Professor, Mechanical Engineering

Joint Appointment with Naval Architecture & Marine Engineering

2019 Auto Lab, 734-936-0423

drd@umich.edu



[Ryan Eustice](#)

Assistant Professor

Naval Architecture and Marine Engineering

Joint Appointment with Electrical Engineering and Computer Science

204 NAME Bldg., 734-647-9411

eustice@umich.edu



[Dale G. Karr](#)

Associate Professor

Naval Architecture and Marine Engineering

237 NAME Bldg., 734-764-3217

dgkarr@umich.edu



[Thomas Lamb](#)

Emeritus Research Scientist and Adjunct Professor

Naval Architecture and Marine Engineering

nalamb@umich.edu



[David R. Lyzenga](#)

Research Scientist

Naval Architecture and Marine Engineering

115 NAME Bldg., 734-764-3216

lyzenga@umich.edu



[Kevin J. Maki](#)

Assistant Professor
Naval Architecture and Marine Engineering
111A NAME Bldg., 734-936-2804
kjmaki@umich.edu



[Okey Nwogu](#)

Associate Research Scientist and Lecturer
Naval Architecture and Marine Engineering
131 NAME Bldg., 734-764-0494
onwogu@umich.edu



[So-Ryeok Oh](#)

Assistant Research Scientist
Naval Architecture and Marine Engineering
131 NAME Bldg., 734-764-0494
srohum@umich.edu



[Michael G. Parsons](#)

Arthur F. Thurnau Professor Emeritus and Professor Emeritus
Naval Architecture and Marine Engineering
parsons@umich.edu



[Anastassios N. Perakis](#)

Associate Professor
Naval Architecture and Marine Engineering
213 NAME Bldg., 734-764-3723
tassos@umich.edu



[Marc Perlin](#)

Professor
Naval Architecture and Marine Engineering
Director of the Marine Hydrodynamics Laboratories
Joint Appointment with Mechanical Engineering
Joint Appointment with Civil and Environmental Engineering
233 NAME Bldg., 734-763-4754
perlin@umich.edu



[William W. Schultz](#)

Professor Mechanical Engineering
Joint appointment with Naval Architecture and Marine
Engineering
2027 Auto Lab, 734-936-0351
schultz@umich.edu



[David J. Singer](#)

Assistant Professor
Naval Architecture and Marine Engineering
216 NA&ME Bldg., 734-764-4509
djsinger@umich.edu



[Anna Stefanopoulou](#)

Professor Mechanical Engineering
Joint appointment with Naval Architecture and Marine
Engineering
G058 Auto Lab, 734-615-8461
annastef@umich.edu



[Jing Sun](#)

Professor
Naval Architecture and Marine Engineering
Joint Appointment with Electrical Engineering and Computer
Science
211 NAME Bldg., 734-615-8061
jingsun@umich.edu



[Armin W. Troesch](#)

Professor
Naval Architecture and Marine Engineering
220 NAME Bldg.,
734-763-6644
troesch@umich.edu



[Nickolas Vlahopoulos](#)

Professor and NAME Graduate Chair
Naval Architecture and Marine Engineering
Joint appointment with Mechanical Engineering
214 NAME Bldg., 734-764-8341
nickvl@umich.edu



[Donald C. Winter](#)

Professor of Engineering Practice
133 NAME Bldg., 734-764-8269
dcwinter@umich.edu



[John \(Jack\) Woodward](#)

Professor Emeritus of Naval Architecture and Marine
Engineering
117 NAME Bldg., 734-764-4296
woodward@umich.edu



[Yin Lu \(Julie\) Young](#)

Associate Professor
Naval Architecture & Marine Engineering
208 NAME Bldg., 734-647-0249
ylyoung@umich.edu



[Steven Zalek](#)

Research Investigator and Lecturer
Naval Architecture & Marine Engineering
111 NAME Bldg., 734-763-7958
zaleksf@umich.edu