

COAST PSM: A Professional Science Master's Program in Marine Science and Technology

Meeting the educational needs of working professionals in the marine sector

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Abstract— Today's professionals in the maritime sectors of industry, government, and non-governmental organizations are expected to develop policy and planning options, while managing both living and non-living marine resources based upon the best available science and technology. Similarly, technologists, engineers, and scientists are faced with managing personnel, funds, and businesses in increasingly challenging fiscal and policy environments. A new type of Master's degree in Marine Science and Technology has been recently initiated by the University of Massachusetts. The Professional Science Master's degree for Coastal and Ocean Administration, Science, and Technology or COAST PSM, is a two-year non-thesis Master's program with the final summer being spent in an internship. COAST PSM blends a study of science and engineering with elective coursework in management, policy, economics, and law and provides strong emphasis on writing and communication skills. COAST PSM students acquire skills and knowledge that will prepare them for entry and mid-career level and technical positions in industry, academia, and government as well as providing industry and government with people targeted to their specific requirements. The current curriculum is a blended combination of on-line and face-to-face in-room classes, with the latter scheduled early and late in the day to accommodate working students. There are also plans underway to expand the selection of courses available on-line. Focus areas of study are specifically aimed at developing skills needed for careers in the Department of Defense and supporting civilian laboratories and private companies, the oil, gas, and construction industries, fisheries management, and environmental assessment and remediation organizations.

Keywords—professional science master's, marine science and technology, education, internships

I. INTRODUCTION

Coastal and marine-related activities are critically important to the economy and societal well-being of the Nation as well as globally. In addition to the economic benefits, our coasts and oceans contribute a great deal to the quality and enjoyment of life for a large segment of the population. However, increasing pressures of coastal population growth along with dire projections of increasing threats to our coasts and oceans necessitate a proactive agenda for improved

understanding and informed management of resources. While marine environments provide tremendous economic and societal benefits, they are also a precious asset that must be carefully observed and managed to ensure their continued and sustainable use.

A thriving coastal and marine economic sector that is carefully managed and sustained will require an increasingly sophisticated workforce to meet the employment needs of both public and private sector entities. Projections of workforce need exceed the expected supply of newly trained graduates given anticipated growth in key areas of the marine sector and accelerating attrition due to an aging demographic [1,2]. The complex issues facing our coastal and marine environments will require a broad range of educational opportunities to meet the diverse needs of employers and students.

An example of one strategy to expand educational opportunities in science and technology has been the recent growth in professional science master's programs [3]. Here, we review the typical characteristics of professional science master's programs and the rationale for such programs in meeting workforce needs. We then describe the Coastal and Ocean Administration, Science and Technology PSM program, a professional science master's program in marine science and technology offered by the University of Massachusetts.

II. THE PROFESSIONAL SCIENCE MASTER'S (PSM)

A. General Characteristics of PSM Programs

The concept for the PSM degree grew out of an initiative funded by the Alfred P. Sloan foundation in 1997 [4]. PSM programs are typically 2 year, non-thesis master's programs and are often developed in conjunction with industry partners who can provide internship opportunities as well as expertise and experience in areas of high workforce demand. PSM curricula typically consist of a blend of interdisciplinary courses in science, technology, engineering and math along with professional components including business, management, and communications [5]. In addition, PSM programs require an experiential component in the form of a capstone project developed collaboratively with an employer and faculty that provides experience in integrating the

scientific, technical, and professional skills acquired during the program.

B. Benefits of a PSM Degree

Although data are limited, there is evidence that PSM graduates are finding positions and that employers seek out students with the skills provided by PSM programs [3]. Recent surveys of PSM graduates indicate a high level of satisfaction with the PSM experience in acquiring new skills and knowledge, increased opportunities for professional advancement, success in finding a career in a desired field, or advancing within a given career track [4]. PSM programs can also provide a stepping stone for further education, as in the case of students interesting in building an educational foundation for advancement to a Ph.D. program.

III. THE COAST PSM PROGRAM

Today's professionals in the maritime sectors of industry, government, and non-governmental organizations are expected to develop policy and planning options, while managing both living and non-living marine resources based upon the best available science and technology. Similarly, technologists, engineers, and scientists are faced with managing personnel, funds, and businesses in increasingly challenging fiscal and policy environments. The University of Massachusetts, through its Intercampus Marine Science program, offers a professional science master's (PSM) degree to meet these needs. The COAST (for Coastal and Ocean Administration, Science and Technology) PSM program is a new opportunity for students to pursue a non-thesis degree that blends a study of marine science with coursework in management, policy, or law, and also has a strong emphasis on writing and communication skills.

This unique program is designed to enable students to enter the workforce immediately as advanced marine science, engineering, and technology professionals. The location of the program in New England places it in a strategic region where there are growing opportunities for careers in a variety of marine related areas. For professionals already in the workforce, the COAST PSM is an excellent way to broaden their knowledge of marine science and technology and current best business practices in their field, while advancing their own careers. Classes are scheduled with an eye toward enabling working professionals to pursue their degrees while maintaining their responsibilities within their places of employment.

A. Course Requirements

The COAST PSM program requires completion of 11 courses plus an internship. The 11 courses include three (3) core courses and eight (8) elective courses. The core courses are intended to provide a common grounding in the biological, chemical, physical, and geological oceanographic areas of marine science and technology, as well as marine policy and/or management disciplines. Elective courses covering additional science and technology areas, along with quantitative skills, are generally subject to student choice and advisor approval.

The core courses include at least two (2) of four (4) science core courses in biological, chemical, geological and physical

oceanography. An additional, third core course in marine policy and/or management areas (including law and economics) is also required.

The 8 elective courses include:

- Four (4) science electives -- 12 credits
- Two (2) elective "Plus" courses, 6 credits total, in areas such as communication, project management, and leadership;
- Two (2) additional science OR two (2) additional elective "Plus" courses, 6 credits total, selected to fit the student's area of concentration.

Within these guidelines, there is considerable flexibility for COAST PSM students to design a suite of courses that meet their specific interests and professional needs. A program coordinator is available to help students select courses under a variety of themes. Course offerings are structured so that students may attend the program part-time while working full-time, as there is no residency requirement.

B. Sequence of Courses

During the first two semesters, COAST PSM students normally complete the core courses and take additional courses towards fulfilling their elective requirements in either the sciences, policy, or "Plus" courses. Additional coursework and a one-semester internship are typically completed in the third and fourth semesters. A total of 34 credits is required for completion of the COAST PSM degree. A full-time student will normally complete the degree requirements in four semesters; a typical part-time student will do so in six semesters.



Fig. 1. The COAST PSM program provide opportunities for hands on experience with state-of-the-art technology. This autonomous underwater vehicle is equipped with a variety of sensors to measure ocean currents and turbulence (photo credit: Frank Smith)

More information about specific courses and program requirements can be found at the following URL:

www.umassd.edu/smast/smastforstudents/degreeopportunities/professionalsciencemastersprogram/

C. Flexibility in Course Scheduling

UMass Dartmouth's School for Marine Science and Technology strives to schedule PSM courses to work around a regular business day. In addition, on-line course options are being expanded to accommodate students in various locations. Applicants may choose to enroll either as a full-time student (a minimum of 9 credits per semester) or as a part time student.

IV. SUMMARY

Professional science master's programs have emerged as a new track for pursuing an advanced degree and PSM graduates have been successful in career placement and professional advancement. Career opportunities in marine science are expected to expand due to attrition of the current workforce and the growing importance of our coastal economic and environmental sectors. The University of Massachusetts COAST PSM program provides an attractive option to students who are already in a professional marine organization or seeking a new career in the marine sector. This program offers an alternative to typical M.S or Ph.D. degree programs, but can

also serve as a step toward advancement to a Ph.D. program. The flexibility of the UMass COAST PSM program makes it a viable option for a wide range of student types from diverse professional and educational backgrounds.

Lastly, the UMass COAST PSM program is relatively unique in its interdisciplinary focus and emphasis on marine science and technology. The COAST PSM program is able to draw on expertise both across the University of Massachusetts system as well as regionally at other institutions, commercial entities, and both state and federal agencies.

REFERENCES

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Fig. 2. Mastering geo-spatial data and gaining experience with equipment used in environmental monitoring and assessment are two option areas for PSM-COAST students (photo credit: Frank Smith).