The College Of
WILLIAM & MARY
1989-90
SCHOOL OF MARINE SCIENCE

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MARINE SCIENCE
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The College of William and Mary
SCHOOL OF MARINE SCIENCE
Calendar 1989-90

1989

FIRST SEMESTER

August 16-25 Registration of Returning Students
August 28-30 New Student Orientation/Registration (Monday-Wednesday)
August 31 BEGINNING OF CLASSES: 8:00 a.m. (Thursday)
September 13 Last day to add/drop courses (Wednesday)
October 16-17 Fall Break (Monday-Tuesday)
October 20 Mid-Semester (for grading purposes only)
November 22 Beginning of THANKSGIVING HOLIDAY: 1 p.m. (Wednesday)
November 27 End of THANKSGIVING HOLIDAY: 8 a.m. (Monday)
December 8 End of Classes: 5 p.m. (Friday)
December 9-11 Reading Period (Saturday-Monday)
December 12-15 Examinations (Tuesday-Friday)
December 16-17 Reading Period (Saturday-Sunday)
December 18-21 Examinations (Monday-Thursday)
December 20 Last date to submit theses and dissertations for December conferral of degrees (Wednesday)
December 22 Official Graduation Date

1990

SECOND SEMESTER

January 2-9 Registration of Returning Students
January 9 New Student Orientation/Registration (Tuesday)
January 11 BEGINNING OF CLASSES: 8 a.m. (Thursday)
January 24 Last day to add/drop courses (Wednesday)
February 10 Charter Day (Saturday)
March 2 Beginning of SPRING VACATION: 5 p.m. (Friday)
March 4 Mid-Semester (for grading purposes only)
March 12 End of SPRING VACATION: 8 a.m. (Monday)
April 23 End of Classes: 5 p.m. (Monday)
April 24-25 Reading Period (Tuesday-Wednesday)
April 26-27 Examinations (Thursday-Friday)
April 28-29 Reading Period (Saturday-Sunday)
April 30-May 4 Examinations (Monday-Friday)
May 5-6 Reading Period (Saturday-Sunday)
May 7 Examinations (Monday)
May 7 Last day to submit theses and dissertations for May Commencement (Monday)
May 13 COMMENCEMENT (Sunday)
1990 SUMMER SESSION

May 21-June 1
Registration of Graduate Students
June 4
Beginning of First Term (Monday)
July 6
End of First Term (Friday)
July 9
Beginning of Second Term (Monday)
August 10
End of Second Term (Friday)
August 10
Last day to submit theses and dissertations for August conferral of degrees (Friday)

BOARD OF VISITORS

Hays T. Watkins LL.D. '82 ................ Rector
Stewart H. Gamage '72 .................. Vice Rector
James E. Ukrop '60 ..................... Secretary

Garner N. Anthony '53
The Honorable Sandra D. Bowen '63
James W. Brinkley '59
Edward J. Campbell
Sharon A. Coles-Stewart '75
The Honorable Richard J. Davis '42
Lewis L. Glucksman '45

Gilbert M. Grosvenor, Litt. Dr. '87
Pamela C. Harriman
Audrey M. Harris '60
Joseph R. Koons '68
James W. McGlothlin '62
Wallace H. Terry
John H. Tucker, Jr. '54

OFFICERS OF ADMINISTRATION

Paul R. Verkuil ......................... President
Melvyn D. Schiavelli ................. Provost
Edward T. Allenby .................... Vice President for
University Advancement
William F. Merck II .................. Vice President for
Administration and Finance
Frank O. Perkins ....................... Dean, School of
Marine Science
Henry Aceto, Jr. ....................... Acting Dean of Graduate Studies,
School of Marine Science
Robert J. Byrne ....................... Associate Director for Research,
School of Marine Science
Paul V. Koehly ......................... Associate Director for Finance and Administration,
School of Marine Science
THE FACULTY OF THE
SCHOOL OF MARINE SCIENCE

Frank O. Perkins, Dean and Professor of Marine Science. B.A., University of Virginia; M.S., Ph.D., Florida State University. Biological Oceanography.

Henry Aceto, Jr., Acting Dean of Graduate Studies and Professor of Biology. B.S., State University of New York, Albany; M.S., University of California, Berkeley; Ph.D., University of Texas.


Marvin L. Wass, Professor Emeritus of Marine Science. B.S., Winona State College; M.S., Florida State University; Ph.D., University of Florida. Biological Oceanography.

Frank J. Wojcik, Assistant Professor Emeritus of Marine Science. B.S., University of Massachusetts; M.S., University of Alaska. Marine Fisheries Science.

Herbert M. Austin, Professor of Marine Science. B.S., Grove City College; M.S., University of Puerto Rico; Ph.D., Florida State University. Marine Fisheries Science.

Michael E. Bender, Professor of Marine Science. B.A., Southern Illinois University; M.S., Michigan State University; Ph.D., Rutgers University. Biological Oceanography.

Rudolf H. Bieri, Professor of Marine Science. Dr.rer.nat. Johann Gutenberg University. Chemistry and Toxicology.


John D. Boon, III, Professor of Marine Science. B.A., Rice University; M.A., Ph.D., College of William and Mary. Geological Oceanography.

Robert J. Byrne, Associate Director for Research and Professor of Marine Science. M.S., Ph.D., University of Chicago. Geological Oceanography.

Michael Castagna, Professor of Marine Science. B.S., M.S., Florida State University. Biological Oceanography.
Mark E. Chittenden, Jr., Professor of Marine Science. B.A., Hobart College; M.S., Ph.D., Rutgers University. Marine Fisheries Science.

William D. DuPaul, Professor of Marine Science. B.S., Bridgewater State College; M.A., Ph.D., College of William and Mary. Marine Fisheries Science.

George C. Grant, Professor of Marine Science. B.S., University of Massachusetts; M.A., College of William and Mary; Ph.D., University of Rhode Island. Biological Oceanography.

William J. Hargis, Jr., Professor of Marine Science. A.B., M.A., University of Richmond; Ph.D., Florida State University. Biological Oceanography.

Robert J. Huggett, Professor of Marine Science. M.S., Scripps Institution of Oceanography; Ph.D., College of William and Mary. Chemistry and Toxicology.

Albert Y. Kuo, Professor of Marine Science. B.S., National Taiwan University; M.S., University of Iowa; Ph.D., The Johns Hopkins University. Physical Oceanography and Environmental Engineering.

Joseph G. Loesch, Professor of Marine Science. B.S., University of Rhode Island; M.S., Ph.D., University of Connecticut. Marine Fisheries Science.

Maurice P. Lynch, Professor of Marine Science. A.B., Harvard University; M.A., Ph.D., College of William and Mary. Marine Resource Management.

William G. MacIntyre, Professor of Marine Science. B.S., M.S., Ph.D., Dalhousie University. Chemistry and Toxicology.

Roger L. Mann, Professor of Marine Science. B.S., University of East Anglia; Ph.D., University of Wales. Marine Fisheries Science.

John A. Musick, Professor of Marine Science. A.B., Rutgers University; M.A., Ph.D., Harvard University. Marine Fisheries Science.


Maynard M. Nichols, Professor of Marine Science. B.S., Columbia University; M.S., Scripps Institution of Oceanography; Ph.D., University of California at Los Angeles. Geological Oceanography.

Morris H. Roberts, Jr., Professor of Marine Science. B.A., Kenyon College; M.A., Ph.D., College of William and Mary. Biological Oceanography.

Gene M. Silberhorn, Professor of Marine Science. B.S., Eastern Michigan University; M.S., West Virginia University; Ph.D., Kent State University. Biological Oceanography.
N. Bartlett Theberge, Jr., Professor of Marine Science. B.S., J.D., College of William and Mary; LL.M., University of Miami. Marine Resource Management.

Kenneth L. Webb, Chancellor Professor of Marine Science. A.B., Antioch College; M.S., Ph.D., Ohio State University. Biological Oceanography.

Richard L. Wetzel, Professor of Marine Science. B.S., M.S., University of West Florida; Ph.D., University of Georgia. Biological Oceanography.

L. Donelson Wright, Professor of Marine Science. B.A., University of Miami; M.A., University of Sydney; Ph.D., Louisiana State University. Geological Oceanography.

John M. Brubaker, Associate Professor of Marine Science. A.B., Miami University; Ph.D., Oregon State University. Physical Oceanography and Environmental Engineering.

Eugene M. Burreson, Associate Professor of Marine Science. B.S., Eastern Oregon College; M.S., Ph.D., Oregon State University. Biological Oceanography.

Fu Lin Chu, Associate Professor of Marine Science. B.S., Chung Chi College; M.S., University of Rochester; Ph.D., College of William and Mary. Biological Oceanography.

Robert J. Diaz, Associate Professor of Marine Science. B.A., LaSalle College, M.S., Ph.D., University of Virginia. Biological Oceanography.

David A. Evans, Associate Professor of Marine Science. B.A., M.A., Cambridge University; Ph.D., Oxford University. Physical Oceanography and Environmental Engineering.

Leonard W. Haas, Associate Professor of Marine Science. A.B., Dartmouth College; M.S., University of Rhode Island; Ph.D., College of William and Mary. Biological Oceanography.

John M. Hamrick, Associate Professor of Marine Science. B.C.E., Georgia Institute of Technology; M.S., Massachusetts Institute of Technology; Ph.D., University of California, Berkeley. Physical Oceanography and Environmental Engineering.

Carl H. Hershner, Associate Professor of Marine Science. B.S., Bucknell University; Ph.D., University of Virginia. Marine Resource Management.

Howard I. Kator, Associate Professor of Marine Science. B.S., Harpur College; Ph.D., Florida State University. Biological Oceanography.

Robert J. Orth, Associate Professor of Marine Science. B.A., Rutgers University; M.A., University of Virginia; Ph.D., University of Maryland. Biological Oceanography.
Evon P. Ruzecki, Associate Professor of Marine Science. A.B., Knox College; M.S., University of Wisconsin; Ph.D., University of Virginia. Physical Oceanography and Environmental Engineering.

Craig L. Smith, Associate Professor of Marine Science. A.B., The Johns Hopkins University; Ph.D., University of Florida. Chemistry and Toxicology.

Beverly A. Weeks, Associate Professor of Marine Science. B.A., Winthrop College; M.S. Tulane University; Ph.D., North Carolina State University. Chemistry and Toxicology.

Thomas A. Barnard, Jr., Assistant Professor of Marine Science. B.A., Milligan College; M.A., College of William and Mary. Marine Resource Management.

James A. Colvocoresses, Assistant Professor of Marine Science. B.S., Tulane University; M.A., Ph.D., College of William and Mary. Marine Fisheries Science.

Rebecca M. Dickhut, Assistant Professor of Marine Science. B.S., St. Norbert College; M.S., Ph.D., University of Wisconsin, Madison. Chemistry and Toxicology.

Mary C. Gibbons, Assistant Professor of Marine Science. B.A., M.S., University of Delaware; Ph.D., State University of New York at Stony Brook. Biological Oceanography.

John Greaves, Assistant Professor of Marine Science. B.Sc., Leeds University; Ph.D., Liverpool University. Chemistry and Toxicology.

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Carl H. Hobbs, III, Assistant Professor of Marine Science. B.S., Union College; M.S., University of Massachusetts. Geological Oceanography.

James E. Kirkley, Assistant Professor of Marine Science. B.S., M.S., Ph.D., University of Maryland. Marine Resource Management.

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Brian W. Meehan, Assistant Professor of Marine Science. B.S., Wagner College; M.S., University of Bridgeport; Ph.D., College of William and Mary. Marine Fisheries Science.
John E. Olney, Assistant Professor of Marine Science. B.S., M.A., College of William and Mary. Biological Oceanography.

Linda C. Schaffner, Assistant Professor of Marine Science. B.A., Drew University; M.A., Ph.D., College of William and Mary. Biological Oceanography.

Michael E. Sieracki, Assistant Professor of Marine Science. B.A., University of Delaware; M.S., Ph.D., University of Rhode Island. Biological Oceanography.

Peter Van Veld, Assistant Professor of Marine Science. B.S., University of North Carolina, Chapel Hill; M.A., College of William and Mary; Ph.D., University of Georgia. Chemistry and Toxicology.

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Gary F. Anderson, Instructor in Marine Science and Specialist in Information Management. B.S., Southampton College; M.A., College of William and Mary. Physical Oceanography and Environmental Engineering.

Kevin P. Kiley, Instructor in Marine Science. B.S., Tufts University; M.A., College of William and Mary. Physical Oceanography and Environmental Engineering.

Jon A. Lucy, Instructor in Marine Science. B.S., University of Richmond; M.A., College of William and Mary. Marine Fisheries Science.


Kenneth A. Moore, Instructor in Marine Science. B.S., Pennsylvania State University; M.S., University of Virginia. Biological Oceanography.

Walter I. Priest, III, Instructor in Marine Science. B.S., Virginia Military Institute; M.S., Old Dominion University. Marine Resource Management.

Martha W. Rhodes, Instructor in Marine Science. B.S., Virginia Polytechnic Institute and State University; M.A., Medical College of Virginia, Virginia Commonwealth University. Biological Oceanography.

Jacques van Montfrans, Instructor in Marine Science. B.S., Florida State University; M.S., Florida Atlantic University. Biological Oceanography.

Susan O. Barrick, Librarian. B.S., Shepherd College; M.L.S., Case Western Reserve. Marine Resource Management.
Professional Faculty

Edmund A. Brummer, III, Assistant to the Associate Director for Finance and Administration. B.S., Lynchburg College; B.S. Christopher Newport College.

Mohamed Faisal Abdel-Kariem, Visiting Associate Research Scientist. B.V. Sci., M.V. Sci., Cairo University; D.V.M., University of Ludwig-Maximillian.

Bruce W. Hill, Marine Data Base Manager. B.S., Christopher Newport College; M.S., Old Dominion University.

A. H. (Hank) Humphreys, Jr., Assistant to the Director. B.A., Emory and Henry College; M.A., Virginia Polytechnic Institute and State University.

Kenneth P. Kurkowski, Oyster Hatchery Manager. B.S., St. John's University; M.S., State University of New York at Stony Brook.

Mark W. Luckenbach, Assistant Research Scientist. B.S., University of North Carolina; Ph.D., University of South Carolina.

Wolfgang Vogelbein, Assistant Research Scientist. B.S., Southampton College; M.S., California State University.

ASSOCIATE FACULTY


Bruce J. Barber, B.S., Ohio State University; Ph.D., University of South Florida. Virginia Institute of Marine Science. Marine Fisheries Science.

Carl Richard Berquist, Jr., B.E., M.S., Vanderbilt University; Ph.D., College of William and Mary. Division of Mineral Resources. Geological Oceanography.

Donald F. Boesch, B.S., Tulane University; Ph.D., College of William and Mary. Louisiana Universities Marine Consortium. Biological Oceanography.

Mitchell A. Byrd, B.S., M.S., Ph.D., Virginia Polytechnic Institute and State University. College of William and Mary. Biological Oceanography.


Michael L. Fine, B.S., University of Maryland; M.A., College of William and Mary; Ph.D., University of Rhode Island. Virginia Commonwealth University. Marine Fisheries Science.

Robert H. George, B.S., University of Maryland; D.V.M., University of Georgia. Gloucester Veterinary Hospital, Ltd. Marine Fisheries Science.

John J. Govoni, A.B., St. Anselm's College; M.S., Southeastern Massachusetts University; Ph.D., College of William and Mary. National Marine Fisheries Service. Marine Fisheries Science.


Robert C. Harriss, B.S. Florida State University; M.A., Ph.D., Rice University. NASA Langley Research Center. Chemistry and Toxicology.

G. David Johnson, B.S., University of Texas at Austin; Ph.D., University of California at San Diego. Smithsonian Institution. Biological Oceanography.


Cynthia Jones, B.A., Boston University; M.S., Ph.D., University of Rhode Island. Applied Marine Research Laboratory, Old Dominion University. Marine Fisheries Science.

Suzette M. Kimball, B.A., B.S., College of William and Mary; M.S., Ball State University; Ph.D., University of Virginia. Virginia Institute of Marine Science. Geological Oceanography and Marine Resource Management.

Martin L. Lenhardt, B.S., M.A., Seton Hall University; Ph.D., Florida State University. Virginia Commonwealth University. Marine Fisheries Science.


Charlotte P. Mangum, A.B., Vassar College; M.S., Ph.D., Yale University. College of William and Mary. Biological Oceanography.


Brenda L. Norcross, A.B., MacMurray College; M.S., St. Louis University; Ph.D., College of William and Mary. Marine Fisheries Science.

Polly A. Penhale, B.A. Earlham College; M.S., Ph.D., North Carolina State University. National Science Foundation. Biological Oceanography.

William G. Raschi, B.A., State University of New York at Geneseo; M.S., Southeastern Massachusetts University; Ph.D., College of William and Mary. Bucknell University. Marine Fisheries Science.


Carl N. Shuster, Jr., B.S., M.S., Rutgers University; Ph.D., New York University. Biological Oceanography.

Kenneth J. Sulak, B.A., Harvard University; M.S., University of Miami. Huntsville Marine Laboratory, Canada. Marine Fisheries Science.


Michael Vecchione, B.S., University of Miami; Ph.D., College of William and Mary. National Museum of Natural History. Biological Oceanography.

James E. Weaver, B.S., M.S., Louisiana State University; Ph.D., University of Virginia. U.S. Fish and Wildlife Service. Marine Fisheries Science.

Michael P. Weinstein, B.A., Hofstra University; M.S., Rutgers State University; Ph.D. Florida State University. Lawler, Matusky and Skelly Engineers. Marine Fisheries Science.

Christopher S. Welch, B.S., Stanford University; Ph.D., Massachusetts Institute of Technology. NASA Langley Research Center. Physical Oceanography and Environmental Engineering.

GENERAL STATEMENT OF POLICY

Within the limits of its facilities and its obligations as a state university, the College of William and Mary opens the possibility of admission to all qualified students without regard to sex, race, color, age, religion, or national origin, and provides reasonable accommodation for handicapped students. The facilities and services of the College are open to all enrolled students on the same basis, and all standards and policies of the institution, including those governing employment, are applied accordingly.

Senior citizens of Virginia who wish to take advantage of fee waiver privileges in order to attend courses at William and Mary are invited to contact the Office of Admissions for full details.

The College reserves the right to make changes in the regulations, charges, and curricula listed herein at any time.
THE COLLEGE OF WILLIAM AND MARY

Founded in 1693 as the second institution of higher education in the country, The College of William and Mary in Virginia is today a small, residential, full-time, coeducational university. It is a state university, drawing seventy percent of its 4,700 undergraduate students from the Commonwealth of Virginia. It is also national and international in character and contribution, enrolling students with varied backgrounds from throughout the nation and from many foreign countries.

William and Mary at the undergraduate level is dedicated to providing a liberal education that is rounded and thorough. All students gain a broad base of understanding and knowledge in arts and sciences in their freshman and sophomore years. In their junior and senior years, they may pursue work toward the Bachelor of Arts or Bachelor of Science degrees in a full range of concentrations in arts and sciences or education, or they may enter a program of study in the School of Business Administration leading to the Bachelor of Business Administration degree.

The College also provides the opportunity for its students to pursue graduate work compatible with the liberal undergraduate program. Several departments in the School of Arts and Sciences offer advanced studies leading to the Master of Arts or Master of Science degrees. The History, Physics, and Psychology departments have programs leading to the Ph.D. and Psy.D. degrees. In the professional schools, the Marshall-Wythe School of Law offers the Juris Doctor degree; the School of Business Administration offers the M.B.A.; and the School of Education offers the Master of Arts in Education, the Certificate of Advanced Study, and the Doctor of Education. The School of Marine Science offers programs leading to M.A. and Ph.D. degrees.

The College's commitment in all programs to liberal education is the source of institutional coherence. William and Mary emphasizes, in its undergraduate, graduate and professional programs, the development of the student as a whole individual. The criterion of excellence in teaching and learning, in class and out of class, is at the heart of the educational process. With such objectives, and with a selective and limited enrollment, the College strives to provide its students with a high quality education, and to make a significant contribution to the Commonwealth of Virginia and to the nation through the development of independent, responsive individuals. Faculty, students, and administrators work closely together to create this educational environment, under the leadership of the Board of Visitors and with the support of the Board of the Society of the Alumni.

Continuing exploration of and participation in innovative and experimental approaches to teaching and learning are a significant aspect of the College's forward movement, and emphasis on research and high quality graduate programs contribute strongly to the development of excellence at William and Mary.

The College is accredited by the Southern Association of Colleges and Schools. It offers a wide range of courses, seminars, and programs both for

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credit and non-credit, in the evening and during the day, at its Williamsburg campus and at the Gloucester Point and Wachapreague campuses of the School of Marine Science. This contribution to the educational enrichment of the citizens of Virginia throughout their careers is provided by the professional schools of education, business, law, and marine science and by the faculty of arts and sciences. It is in keeping with the College’s commitment as a state institution to community service and enhanced educational opportunities for the adult citizens of the Commonwealth, and for its more than 30,000 alumni.

William and Mary is a college community, small enough to provide for relationships that allow true teaching and learning, large enough to have the resources to achieve excellence. An important aspect of this community is the location of the College in the beautiful and historic city of Williamsburg, where it constitutes an integral part of the restoration of Colonial Williamsburg. The partnership of the College, the City, the Restoration, and the educational, cultural and recreational opportunities afforded to all students at the College by this partnership add to the quality of life and the quality of education at William and Mary.

Ms. Hilary Neckles (left), winner of Virginia Institute of Marine Science, School of Marine Science 1989 John M. Zeigler Outstanding Student Award
History

The School of Marine Science had its inception in the establishment of the Virginia Fisheries Laboratory by the Commonwealth in 1940. From 1940 until 1959 the academic program of the Laboratory was conducted by the Department of Biology of the College of William and Mary.

In 1959 the program became the Department of Marine Science, and in 1961 the Board of Visitors established the marine training program as the School of Marine Science. The General Assembly in 1962 reestablished the Virginia Fisheries Laboratory as the Virginia Institute of Marine Science, an independent research and service institution providing educational offerings in the marine sciences. In 1979 the General Assembly merged the Institute with the College of William and Mary.

Laboratories of the Institute originally were on the main campus at Williamsburg and at Yorktown. In 1950 the first permanent building was erected on the present campus at Gloucester Point, across the York River from Yorktown. The School awarded its first master's degree in 1943, and in 1964 inaugurated a doctoral program in Marine Science.

Facilities

Students of marine science (including marine fisheries science, biological, chemical, geological, and physical oceanography, and certain other areas of concentration including marine resource management), through offerings of the School of Marine Science, have the unusual opportunity to participate in advanced undergraduate and graduate education at an active, year-round center of marine research.

The principal marine campus is located at Gloucester Point on the York River, an important estuary with easy access to the Chesapeake Bay and the nearby Atlantic. The Institute and the School are admirably situated for performing research and teaching marine, estuarine, and freshwater biology, chemistry, geology, physical oceanography, and marine engineering. The campus of the Eastern Shore Branch Laboratory at Wachapreague, Virginia, offers access to the embayments, salt marshes, barrier beaches, and coastal waters of Virginia's Eastern Shore. The Wachapreague facility has laboratories for mariculture and research as well as dormitory and classroom space.

The first permanent building, Maury Hall, constructed in 1950, is devoted primarily to laboratories. Brooke Hall (1958) contains offices and other laboratory facilities, and Davis Hall (1961) houses the scanning and transmission electron microscopes. The second floor of Davis Hall (added in
houses laboratories associated with the microbiology program. Byrd Hall (1969) houses ecology-pollution, chemistry, and laboratories. Jefferson Hall (which was purchased in 1966 and enlarged in 1972) houses most of the faculty and staff of marine fisheries science and laboratories as well as the vertebrate and invertebrate collections of the Institute. Six buildings have flow-through saltwater systems providing additional experimental facilities. Modern, well-equipped chemical laboratories allow scientists and students to pursue marine chemistry with state-of-the-art facilities. The small-boat basin and Newport Building are located at the Franklin Marine Center. The Division of Physical Oceanography and Environmental Engineering is quartered in several buildings about the campus as well as at the Franklin Marine Center. Geological oceanography is centered in the Hoxton Building and has facilities in several adjacent buildings. Watermen’s Hall, completed in 1984, contains three fully-equipped teaching laboratories, three classrooms, a marine science library containing approximately 34,000 volumes and 1,500 serial titles, a time-sharing PRIME 9955 model II computer, as well as central administration, advisory services, and a 273-seat auditorium.

The Institute has an extensive complement of modern scientific equipment including a mass spectrometer, two electron microscopes (scanning and transmission) and a side scan sonar system. A hydraulic flume is housed in the Franklin Marine Center.
AIM OF THE SCHOOL OF MARINE SCIENCE

The aim of the School of Marine Science of the College of William and Mary is to provide excellence in graduate education to students pursuing careers in marine science with an emphasis on estuaries and the coastal ocean. The academic program is closely interwoven with the mandated research program of the Virginia Institute of Marine Science and this linkage is considered one of its major strengths. Inasmuch as the research and advisory programs of the Virginia Institute of Marine Science emphasize applied research in consideration of management needs, students in the allied School of Marine Science benefit from a mix of pure and applied science. An objective of the SMS program is thus to provide a fertile environment capable of producing high quality marine science scholars as well as disciplined professionals oriented to management issues. Graduate studies leading to the Master of Arts and the Doctor of Philosophy degrees are offered within a comprehensive academic program which allows all students the opportunity for close interaction with a faculty involved on a day-to-day basis in research and management activities.

Dr. Eugene Burreson, 1989 Virginia Institute of Marine Science, School of Marine Science Outstanding Teacher
PROGRAM

The program of the School of Marine Science is intended primarily for the student who wishes to specialize in marine science at the graduate level. The degrees offered are the Master of Arts and Doctor of Philosophy in Marine Science. The School is divided into the following subfaculties with various areas of interest. CHEMISTRY AND TOXICOLOGY: Studies of equilibria and kinetics of natural and anthropogenic chemicals in water, sediments and biota; estuarine chemistry of organic compounds, organometallics and trace metals; analytical methods research; surface chemistry of sediments; and effects of introduced and natural chemicals. GEOLOGICAL OCEANOGRAPHY: Studies of the physical processes, morphology, stratigraphy and composition of estuaries, beaches, and the inner continental shelf including quantitative studies of sediment-fluid interactions and the benthic boundary layer. PHYSICAL OCEANOGRAPHY AND ENVIRONMENTAL ENGINEERING: Studies of physical dynamics of estuaries and continental shelf, including tidal motion, density- and wind-driven circulation and turbulent mixing; mathematical simulation of estuarine circulation, salt intrusion and water quality; benthic boundary layer exchanges and influences on water quality and circulation. BIOLOGICAL OCEANOGRAPHY: Studies of the ecology, biochemistry and physiology of marine and estuarine organisms, including structure and function of seagrass, saltmarsh and plankton communities; ecological modeling, parasitology, taxonomy, microbiology, benthic ecology, and pollution studies. MARINE FISHERIES: Studies of living marine resources, including life history, taxonomy, physiology, ecology, statistics and population dynamics, and modeling of marine fishes, mammals, turtles, crustaceans, and molluscs, and/or their fisheries; recreational and commercial development, utilization and economics of fisheries. MARINE RESOURCE MANAGEMENT: Studies of marine science and the interaction of science, economics, sociology, law institutions, and politics in the development of public policy and the practice of resource management. Although a student would generally choose a major within one of the listed subfaculties, interdisciplinary research is also encouraged.

Students who wish to enter into the doctoral program must hold a master’s degree from an accredited institution; however, it is possible for students to by-pass the master’s degree with the approvals of the Academic Status and Degrees Committee and the Dean.

Though the courses offered by the School are primarily for graduate students, advanced undergraduates (juniors and seniors) may participate. For instance, biology, chemistry, and geology majors may enroll in suitable 500 level courses. Undergraduates majoring in chemistry, geology, physics, or physiology may work on problems in their fields of specialization. Consent of the Chairman of the student’s major department is required for an undergraduate student to take problems courses in marine science.
Approved marine science courses are offered at Williamsburg, but most are conducted on the campus of the School of Marine Science at Gloucester Point, Virginia. Usually, thirty minutes are required to make the passage.

The faculty is heavily engaged in research in addition to teaching. Students have an unusual opportunity to become intimately familiar with their fields of interest. This advantage is increased by the fact that the student’s entire program is carried out on the coast. Time is not lost in traveling from an inland campus to the sea; and the sea itself is a constant classroom companion.

**PREPARATORY STUDIES**

Students who are seriously interested in marine science as a profession should consult with the Dean of the School as early in their college careers as possible regarding an academic program to be followed.

In general, all science is highly quantitative. Regardless of one’s field of concentration, a solid background in mathematics through differential equations, a year of statistics, physics, and chemistry, and competence with computers is highly recommended. Students interested in biological oceanography or marine fisheries science should take, in addition to the quantitative courses listed above, organic chemistry, biochemistry and a suite of contemporary biology courses.

The prospective chemical, geological, or physical oceanographer should have an undergraduate major in chemistry, physics, meteorology, geology, engineering, or mathematics. It is assumed that any one of these physical science degrees includes the quantitative courses discussed above, but particularly helpful are courses in fluid mechanics, time series analysis, and thermodynamics.
DESCRIPTION OF COURSES

501. Introduction to Physical Oceanography. Fall (3) Mr. Ruzecki.  
Prerequisites: Undergraduate Physics, Undergraduate Math.  
Physical properties of seawater, descriptive oceanography, air-sea interactions, heat budget, methods and measurements, dynamics of circulation, waves and tides. Required of all students unless justification for exemption is approved by the Dean of the School of Marine Science upon the recommendation of the appropriate faculty committee. Lectures and laboratory.

502. Introduction to Chemical Oceanography. Spring (3) Staff. Prerequisite: Undergraduate Chemistry.  
Major and minor components of seawater, the concept of residence time, solution chemistry of organic compounds, nutrient cycling, dissolved gases, radioactive dating, geochemical cycles, biosynthesis in marine environments, organic geochemistry, anthropogenic input. Laboratory demonstration of analytical methods for organic analysis. Required of all students unless justification for exemption is approved by the Dean of the School of Marine Science upon the recommendation of the appropriate faculty committee.

503. Introduction to Biological Oceanography. Fall (3) Mr. Burreson.  
Introduction to biological oceanographic processes emphasizing primary production and nutrient cycling; plankton, nekton and benthic processes, including feeding and reproduction strategies and animal/sediment relations; population regulation; estuaries as ecosystems. Required of all students unless justification for exemption is approved by the Dean of the School of Marine Science upon the recommendation of the appropriate faculty committee. Lectures and laboratory.

504. Introduction to Geological Oceanography. Spring (3) Mr. Boon, Mr. Hobbs, Mr. Wright.  
Concepts of marine geology; coastal processes, sea-floor spreading and plate tectonics, sediments and sedimentation, shelf and canyon development. Required of all students unless exemption is approved by the Dean of the School of Marine Science upon the recommendation of the appropriate faculty committee. Lectures and field trips.

506. Introduction to Marine Science. Summer Session (3) Mr. Loesch.  
A general introduction to marine science, including biological, chemical, geological, and physical oceanography. Normally taught on the Williamsburg campus. Not open to graduate students in the School of Marine Science; credit earned cannot be applied to the School's degree program.
508. Introduction to Computers for Marine Scientists. Fall (1) Mr. Anderson.

An introduction to the use of computers in scientific research. Topics covered include the creation, editing and organization of files into directories, and an introduction to software systems for data analysis (SPSS, SAS), spatial analysis (SURFACE II), word processing (WordMarc), and graphics (SPSS, SAS, and BAYPLOT). Class assignments will be carried out on the VIMS time-sharing minicomputer system; however, the role of microcomputers in marine research will also be discussed. One lecture hour and two laboratory hours weekly.

509. Program Design and Data Structures Using Pascal. Spring (2) Staff.

Structured programming techniques are presented using the Pascal programming language. Elementary data structures are presented with attention to forms which are useful in scientific programming. Practical applications are stressed with emphasis on graphics in the latter portion of the course. The linkage of system and user-written libraries to Pascal programs is covered. Class assignments are carried out on the VIMS PRIME 9955 model II system.

510. Marine and Freshwater Invertebrates. Summer, even-numbered years (4) Staff.

Classification and identification, adaptation, ecology, life histories. Local marine, estuarine and freshwater forms emphasized. Lectures, laboratory and field trips, twenty-six hours per week for five weeks.

511. Analytical Instrumentation and Methods. Fall, even-numbered years (2) Staff.

Discussion and demonstration of analytical instrumentation and methods including chromatography, mass spectrometry, electrophoresis, atomic absorption spectrophotometry, and related techniques. Discussion of sample preparation, quality control, quantification, etc.

512. Marine Botany. Summer, odd-numbered years (4) Staff.

A general introduction to the ecology and systematics of algae and tracheophytes encountered in the marine environment. Lectures, laboratory and field trips, twenty-six hours per week for five weeks.

513. Coastal Botany. Fall (3) Mr. Silberhorn.

A general survey of maritime vascular plant communities. Marshes, swamps, beaches, dunes, maritime forests and submerged aquatic communities of the coastal region. Field trips, laboratory and lectures.

514. Introduction to Immunology of Marine Organisms. Spring (3) Ms. Weeks, Mr. Warinner.

A course dealing with fundamental concepts in immune responses. The development of cellular and humoral immune responses and their regulation are considered in relation to infectious disease, allergy, tissue transplantation,
neoplasia, autoimmune disease and immunodeficiency. Also considered are
the properties of antigens and immunoglobulins, immunologic specificity and
methods for monitoring immune responses. Acquired and innate immunity
and the structure and function of the lymphoreticular system of fish will be
considered in detail.

516. Mathematical Review for Marine Scientists I. As required (3) Mr. Evans.
A review of mathematical techniques and concepts with which a student in
marine science is expected to be familiar. A pragmatic approach to the topics
is adopted with examples of applications of mathematical notions whenever
possible. Topics to be covered include: elementary algebraic manipulation,
linear and quadratic equations, simultaneous equations, trigonometry,
analytical geometry, binomial theorem, exponents and logarithms, and
elementary differential calculus.

517. Mathematical Review for Marine Scientists II. As required (3) Mr. Evans.
A review of mathematical techniques and concepts with which a student in
marine science is expected to be familiar. A pragmatic approach to the topics
is adopted with examples of applications of mathematical notions wherever
possible. Topics to be covered include: integral calculus, simple differential
equations, vectors, matrices (linear algebra).

519. Computer Applications in Marine Science. As required (1) Staff.
Course designed primarily for students who require special programming
for analysis of their research data. Following instruction in basics of
programming language, each student will develop, with guidance, one or
more computer programs pertinent to his or her thesis research.

520. Literature Search and Scientific Writing. Spring (1) Mr. Grant, Ms.
Barrick.
Instruction in use of selected abstracting and indexing services appropriate
to marine science and development of search strategy techniques applicable
to on-line data bases. Step-by-step analysis of the preparation of a journal
article. Structure and content of research and thesis proposals.

560. Thesis. Fall, Spring, and Summer (hours to be arranged).
Original research in biological, physical, chemical or geological
oceanography, marine fisheries science, and marine resource management.
Project to be chosen in consultation with the student’s major professor and the
Dean of the School.

597. Problems in Marine Science. Fall, Spring, and Summer (1-4) Staff.
Supervised projects selected to suit the need of the graduate student.
Projects are chosen in consultation with the student’s supervising professor
and the instructor. Credit hours depend upon the difficulty of the project and
must be arranged with the instructor in advance of registration. (See MS 697).
598. Special Topics in Marine Science. Fall, Spring, and Summer (1-3) Staff.
This is the avenue through which subjects not covered in other formal courses are offered.
These courses are offered on an occasional basis as demand warrants. Subjects will be announced prior to registration. Hours to be arranged.

601. Marine Science Seminar. Fall and Spring (1) Staff.
The organization and presentation of scientific data. Oral discussion and written outlines and critiques of selected seminar topics are required.

602. Advanced Biological Oceanography. As required (3) Staff.
Lecture and selected seminar topics covering broad concepts, principles and patterns in biological oceanography. Emphasis is on coastal and oceanic ecosystems. Recommended for advanced graduate students.

An introduction to the history of the management of natural resources and a survey of principles and theories associated with resource management. Although the course addresses general concepts, marine oriented materials and examples will be emphasized.

605. Radiobiology. As required (2-4) Mr. Warinner.
The principles of tracer techniques and procedures for radio-assay determinations in marine studies. Lecture and laboratory.

606. Fisheries Oceanography. Fall (3) Mr. Austin. Prerequisite: Physical Oceanography or Marine Fisheries Science.
Concept of the effects of natural environmental variability on the recruitment, availability (yield), abundance and behavior of living marine resources. Application to real-time fishing operations and climate scale analysis of fishery fluctuations. Two lecture hours and one laboratory hour.

607. Marine Microbiology. Spring, even-numbered years (4) Mr. Kator, Staff. Prerequisite: Biology 301 or equivalent.
Morphology, physiology, ecology, taxonomy, and methods of isolation, cultivation environmental variability and identification of micro-organisms encountered in the marine environment. Three lecture and four laboratory hours.

608. Ichthyology. As required (3 or 5) Mr. Musick.
Functional morphology, behavior, ecology, zoogeography and evolution of fishes. Seven lecture, laboratory and field hours. Three credits without laboratory; five credits with laboratory.

609. Oceanographic Instrumentation. As required (1) Mr. Ruzecki.
General description and function of field sensors, instrument suites and sampling equipment used to study the marine environment to include
meteorological, hydrographic, geological, geophysical, chemical and biological measurements. Deployment, retrieval, general maintenance and cost of equipment is stressed. Lecture and demonstration.

610. Pollution Biology. As required (3) Mr. Bender.
   Study of the various types of pollutants, domestic and industrial wastes, soils, insecticides and radioactive materials and their effects on the marine environment.

611. Advanced Analytical Methods for Water Quality Studies. Summer (1) Mr. Neilson, Staff.
   Analytical methods used in assessing water quality conditions in the estuarine and marine environment will be presented. Techniques presented will include basic and specialized physical, chemical, geological, and bacteriological measurements. Related topics, such as NPDES regulations, standardization of procedures and analytical quality control, will be discussed. Three laboratory hours.

612. Diseases of Marine Organisms. Fall, odd-numbered years (4) Mr. Burreson, Staff.
   Identification, life cycles, pathology and control of disease agents, including viruses, bacteria, protozoa, helminths and arthropods in marine fishes and shellfishes. Three lecture and two laboratory hours.

613. Experimental Ecology and Behavior. Fall, alternate years (1-4) Mr. Lipcius, Mr. Luckenbach. Prerequisite: Marine Science 507.
   The design, conduct, analysis and interpretation of field and laboratory experiments in ecology and behavior. Includes lectures, discussion and supervised field and laboratory projects designed to illustrate the diversity of experimental approaches in use by ecologists and ethologists. Topics include experimental design, advanced statistical techniques, modeling, predator-prey dynamics, recruitment phenomena, life history tactics, intraspecific competition, benthic processes and others emphasizing recent ecological and behavioral advances.

614. Coastal Processes. As required (3) Mr. Nichols. Prerequisites: Marine Science 501 and 504 or consent of instructor.
   Sedimentary processes of erosion, transportation and deposition in response to energy by currents, waves, organisms and man. Character of sedimentary features in a range of environments: estuaries, lagoons, marshes, tidal flats and the continental shelf. Readings of classics, field trips and seminars with discussion of recent advances and controversial questions.

616. Statistics for Marine Scientists I. Fall (3) Mr. Diaz.
   Introduction (jointly with MS 635) to statistical analysis including descriptive statistics, distributions, probability, hypothesis testing, and matrix algebra. Advanced topics include correlation, linear regression, sampling and
experimental design, and one-way analysis of variance. Two lecture hours and
one lecture hour of computer lab with assigned problems. Required of all
students unless justification for exemption is approved by the Graduate Dean
of the School of Marine Science upon the recommendation of the appropriate
faculty committee. Geostatistics, MS 635, may be substituted to meet course
requirements.

617. Biology of Estuarine Fishes. Spring (3) Staff. Prerequisite: Marine
Science 608.
Life history, ecology and zoogeography of typical fish taxa inhabiting
estuaries along the Atlantic seaboard. Emphasis of behavioral and
morphological adaptations in response both to contemporary ecology and the
evolutionary history of individual species. Research project on a selected
species required. Enrollment limited. Three lecture hours and field trips.

618. Marine Fisheries Science. As required (4) Mr. Austin.
Principles and techniques, including the theory of fishing, age and growth,
definition of stocks, catch statistics, description of world fisheries, goals and
problems in managing a common property resource. Six lecture, laboratory
and field hours.

619. Statistics for Marine Scientists II. Spring (3) Mr. Loesch. Prerequisite:
Marine Science 507 or equivalent.
Concepts and methods of experimental statistics, including advanced
analysis of variance designs, regression, analysis of covariance, and factorial
arrangements. Lecture and laboratory required of all students in Marine
Fisheries Science.

620. Organic Geochemistry of the Marine Environment. As required (2) Mr.
Bieri, Mr. Kator. Prerequisite: Organic Chemistry.
The course will provide an overview of both non-biogenic and biogenic
aspects of diagenetic processes in recent marine sediments. Basic concepts
discussed include the importance of physical-chemical conditions,
characteristic changes in molecular structure, and the role of microorganisms
in the diagenetic process.

621. Advanced Chemical Oceanography. As required (3) Mr. MacIntyre.
Prerequisites: Chemistry 202, Math 203, and Physics 102.
Physical chemistry of electrolytic solutions. Study of equilibrium and non­
equilibrium models of chemical processes occurring at water-sediment, water­
organism, and water-atmosphere boundaries.

622. Mass Spectrometry of Organic Molecules I. Fall (2) Mr. Bieri.
Prerequisite: Consent of instructor.
Ionization of atoms and molecules, the deflection of charged particles by
electric and magnetic fields. Discussion of different methods of mass to charge
separation. Description of several types of mass spectrometers and special
requirements for GS-MS systems. Other subjects including vacuum techniques and detection methods.

623. Mass Spectrometry of Organic Molecules II. Spring (1) Mr. Bieri. Prerequisite: Marine Science 622 or consent of instructor.
   Interpretive aspects of mass spectra. General discussion of fragmentation. Systematic trends linked to molecular structure will be treated and explained through the use of key examples. Active participation of the student is expected.

   Class review and analysis of case studies involving the management of marine resources including socio-economic, political, and legal aspects.

625. Hydromechanics. As required (3) Mr. Hamrick. Prerequisite: Marine Science 517 or equivalent.

626. Finite-Difference Methods in Fluid Mechanics. As required (3) Mr. Hamrick. Prerequisites: Marine Science 516 or equivalent, Marine Science 625 or equivalent, programming ability in FORTRAN, Pascal or similar language.
   An examination of the numerical solution of partial differential equations governing the conservation of mass and of momentum. Topics include spatial differencing, explicit and implicit time differencing, numerical viscosity and dispersion, stability and convergence.

627. Advanced Physical Oceanography. As required (3) Mr. Brubaker, Prerequisite: Marine Science 625 or consent of instructor.
   Elements of the dynamics of natural waters, beginning with an overview of the general governing equations and some useful approximations. Effects of variable density, Earth’s rotation, and wind forcing, in various combinations, will be examined. The focus will be on settings where bottom topography and the presence of lateral boundaries influence the dynamics, as in continental shelf waters and inland seas.

628. Biological Oceanographic Processes. Spring (3) Staff.
   Lecture and discussion of contemporary concepts in oceanographic processes emphasizing microbial-plankton interactions, zooplankton, benthic processes, population dynamics, nutrient cycling and systems, and simulation modeling. Required of all students in biological oceanography.
629. Introduction to Benthic Boundary Layers and Sediment Transport. As required (3) Mr. Boon, Mr. Byrne, Mr. Wright.

Physical and geological aspects of coastal and estuarine benthic boundary layers, their dynamic forcings and the associated suspension and transport of granular sediments. Principles of waves, tides and currents are introduced with emphasis on shallow-water processes. Boundary layer structure and shear stress on the seabed, wave boundary layers and turbulence are considered in relation to the coastal environment. Forces on sediment particles, initiation of sediment movement and principles of sediment transport are treated at an intermediate level.

630. The Early Life History of Marine Fishes. As required (3) Mr. Olney.

Development, physiology, behavior, and ecology of egg, larval and juvenile stages with special reference to adaptations for larval survival in the sea. Egg and larval taxonomy, techniques in rearing, and egg and larval sampling methods will be outlined. Two lecture and two laboratory hours.

631. Estuarine Hydrodynamics I. As required (3) Mr. Kuo. Prerequisite: Marine Science 625.

Classification of estuaries, time scales of motions, tidal dynamics in estuaries, non-tidal circulation, mechanism of arrested salt wedge, gravitational circulation, diffusion induced circulation, turbulence in stably stratified flows.

632. Estuarine Hydrodynamics II. As required (3) Mr. Kuo, Mr. Hamrick. Prerequisite: Marine Science 631.

Zero-, one- and two-dimensional descriptions of estuaries, salt intrusion, pollutant flushing, sediment transport through estuaries, field experience in estuaries, model laws for estuarine models.

634. Scientific Information Resources. Spring, odd-numbered years (1) Mr. Lynch.

A review of available data bases, referral systems, federal information programs, etc., which would aid scientists or environmental managers in obtaining information relative to their research or management needs.

635. Geostatistics. Fall (3) Mr. Boon, Mr. Evans.

Introduction (jointly with MS 616) to probability and statistical concepts including probability distributions, sample estimates, hypothesis testing and elements of matrix algebra. Advanced topics include analysis of variance, least squares curvilinear regression, eigenvector methods, principal component analysis, factor analysis and an introduction to autocorrelation and time series analysis. Two lecture hours and one hour of computer lab with assigned problems. May be substituted for required course MS 616 (formerly MS507), Statistics for Marine Scientists I.
636. Ecological Modeling and Simulation and Analysis. Fall, As required (3) Mr. Wetzel. Prerequisite: Consent of instructor.
Theoretical and practical aspects of conceptualizing, simulating and analyzing digital computer models of estuarine and marine ecosystems. Systems theory, control and optimization is presented in terms of ecological processes. Computer modeling project required.

Classical and recent work on wetlands ecology, primarily in tidal marshes. Emphasis on the analysis of the marsh system at the community level. Introduction and practical experience in common research techniques, including vegetation mapping, sediment coring and faunal sampling methods. Individual research project and/or paper expected. Lectures and field trips.

638. Turbulent Diffusion and Dispersion. As required (3) Mr. Kuo, Mr. Brubaker. Prerequisite: Marine Science 625.
Principle of mass conservation, gradient transport theories, turbulent transport and concept of eddy diffusivity, mixing-length theory, higher order turbulence models, dispersion in shear flow, in oscillatory flow and in stratified flow, applications of dispersion theories in estuaries and open seas.

Water quality parameters, application of mass-balance equation, dissolved oxygen modeling, ecosystem modeling, finite difference approximations, finite element techniques, numerical integrations, time scales and spatial dimensions, survey of different types of models.

640. Dynamics of Fisheries Populations. Fall (4) Mr. Chittenden.
Principles and practices of stock identification, recruitment, growth, abundance, mortality, and regulation and yields of fisheries stocks.

641. Waves and Their Analysis. As required (3) Mr. Wright, Mr. Boon. Prerequisite: Marine Science 501.
Introduction to linear wave theory and shoaling wave transformations, wave dispersion, radiation stress, refraction, reflection, and topographic trapping. Mechanisms of wave generation in the coastal boundary layer including oscillations at infragravity, tidal, and transtidal frequencies. Time series analysis, interpretation of wave records using harmonic and spectral methods and computer labs on the VIMS PRIME 9955 model II system.

642. Satellite and Aerial Marine Remote Sensing. Fall, odd-numbered years (2) Mr. Kiley. Prerequisite: Marine Science 501.
Theory and techniques in satellite and aerial marine remote sensing and associated image processing operations. Emphasis on analysis of remotely-sensed sea-surface features (color, temperature, salinity, etc.), wetlands, shorelines, and nearshore areas. Laboratory sessions will employ interactive
image processing equipment for analysis, enhancement, and display of remotely-sensed marine data. Lecture and laboratory.

643. Theoretical Ecology. Fall (3) Mr. Luckenbach, Mr. Lipcius.
Lecture and discussion of fundamental ecological theory. Emphasis is placed on defining testable aspects of modern ecological theory and evaluating recent empirical work within the framework of this theory. Topics include life history strategies, optimization theory, factors regulating populations and structuring communities, successional models, island biogeography, and ecosystem models.

644. Chemical Carcinogens. As required (3) Staff.
A basic toxicology course primarily designed for multidisciplinary students interested in historical background, classification, metabolism by host tissues, interactions with cellular macromolecules, modifying factors, and bioassays of chemical carcinogens.

645. Marine Phytoplankton. Spring, even-numbered years (3) Mr. Haas, Staff. Prerequisites: Marine Science 501, 502, 503, and 504.
Contemporary problems in marine phytoplankton investigations. Factors controlling the distribution, abundance, and production of planktonic organisms. Five lecture and laboratory hours.

646. Marine Zooplankton. Spring, odd-numbered years (3) Mr. Grant.
The morphology, adaptations, distribution, taxonomy and ecology of marine zooplankton with attention to interrelationships with the remaining biota. Five lecture and laboratory hours.

647. Marine Benthos. Spring, odd-numbered years (3) Mr. Diaz. Prerequisites: Marine Science 503, 510 or equivalent.
Ecology of marine benthic organisms. Factors affecting distribution, benthic habitats, structure and function of communities, biotic interrelationships and analytical techniques.

An introduction to the economic theories and principles which determine the exploitation, utilization, and management of marine resources. The course presents theories and principles in mathematical terms, but the interpretation and understanding of policies and solutions are emphasized.

649. Marine Science in Public Affairs. As required (2) Mr. Hargis, Staff.
Consideration of the methods by which public policy and programs regarding marine resources and the environment are established and executed and the role of marine science in those activities. The structure, functioning and management of modern marine research and advisory institutions. Interaction between science and technology and public environment and
resource management activities. Discussion of the problems and premises of marine science in public affairs. Lecture, discussion and observation.

650. Law and Resource Management. Spring (1-3) Mr. Theberge.
An interdisciplinary course designed to examine the interrelationships between scientific and legal concepts. Issues, legislation, and institutions associated with coastal zone management, outer continental shelf development, fisheries, and other questions related to marine resource management will be examined.

652. Practical Application of Marine Resource Management Techniques. Fall and Spring (1 to 4) Staff. Prerequisite: Marine Science 650.
This course is designed to offer students possessing management fundamentals an opportunity to participate in real world management activities under the guidance of involved faculty members and association and consultation with members of various levels of government. Such activities will possibly include but not be limited to issue identification and resolution, committee involvement at local, regional, state, interstate, and federal levels of government, development of management plans, drafting position papers, developing draft legislation and exposure to policy making mechanisms.
Student requirements may vary significantly depending on the management issue(s) addressed. Students will be evaluated on participation, written work (memoranda, position papers, etc.) and knowledge gained as evidenced by interaction with staff and by other means. Students may repeat the course provided the instructor determines there is no duplication of material. Credit, which must be arranged in advance of registration, will depend upon difficulty of the assignment.

653. Secondary Production of Invertebrates. As required (3) Mr. Diaz.
Principles and theories of secondary production. Physical and biological factors influencing production, role of habitat complexity, implications for community structure, estimation of trophic resources and techniques of measuring secondary production.

654. Oligochaete Biology. As required (2) Mr. Diaz.
Taxonomy of aquatic and marine oligochaetes, life history strategies and ecology, and the role of oligochaetes in benthic communities.

656. Seagrass Ecosystems. As required (1-2) Mr. Wetzel.
A lecture-seminar course covering topics related to seagrass ecosystems. Emphasis on the structure and function of seagrass communities, submerged angiosperm physiology, primary and secondary production, and integration of seagrass communities to the marine environment. Students will be assigned projects to complete. Credit, which must be arranged in advance of registration, will depend upon difficulty of the assignments.

657. Light Microscopy for Marine Scientists. As required (2) Mr. Hargis, Staff.
Principles and practice of various techniques of light microscopy in research and teaching in the marine sciences and related scientific fields. Two lectures and laboratory hours. Research project required.

658. History of Marine Science. As required (3) Mr. Hargis.
Comprehensive review and evaluation of the major events, personages, and organizations involved in the development of marine science and marine resource management, the acquisition of knowledge of the World Ocean, its coastal waters and tributaries, and the ability to work on and in the sea and make use of its resources and amenities, with consideration of the impacts of the resources and amenities of the ocean on the affairs of men. Lecture, discussions and reading. All students will be required to prepare and submit a suitable course-related term paper.

Introduction to the biology and ecology of marine molluscs. Laboratory and field trips augment the lectures and demonstrate the diversity of local molluscan fauna, habitat and ecology. Three lecture and three laboratory hours.

660. Dissertation. Fall, Spring and Summer (hours to be arranged).
Original research in biological, physical, chemical or geological oceanography, marine fisheries science, or marine resource management. Project to be chosen in consultation with the student's major professor and the Dean of the School.

697. Advanced Problems in Marine Science. Fall, Spring and Summer (1-4) Staff.
Supervised projects selected to suit the needs of the graduate student. Projects to be chosen in consultation with the student's major professor and the instructor. Acceptable research outlines and project reports are required. Amount of credit depends upon difficulty of course. Hours to be arranged with instructor prior to registration. The degree of difficulty and requirements of this course surpass those of MS 597.
698. Special Topics in Marine Science. Fall, Spring and Summer (1-3) Staff.
This is the avenue through which subjects not covered in other formal courses are offered.
These courses are offered on an occasional basis as demand warrants. Subjects will be announced prior to registration. Hours to be arranged.
DEGREE REQUIREMENTS

General

Students generally are bound by the requirements stated in the catalog which is in effect when they enter the School. The following are usually the minimum requirements. The separate subfaculties and individual advisory committees may prescribe additional requirements for their students.

To fulfill the full-time academic residency requirement of the School of Marine Science, students must enroll for one of the following:

1. Twelve hours in the Fall semester and twelve hours in the following Spring semester;
2. Twelve hours in the Spring semester and twelve hours in the following Fall semester;
3. Twelve hours in the Spring semester, followed by six hours in Summer Session I and six hours in Summer Session II; or
4. Six hours in Summer Session I, six hours in Summer Session II, and twelve hours in the following Fall semester.

Receipt of a grade below C generally presages dismissal from the School. Each student must satisfactorily complete a comprehensive examination within one regular semester, excluding summer sessions, following completion of the core courses. Comprehensive examinations may be written or oral.

All active students (i.e. those working toward completion of a degree program who have not been granted leave), whether in residence or not, must register for a minimum of three paid hours each semester, and one paid hour for each term of the summer session. Students must be registered in the semester during which they graduate.

Classified (regular) students who have exceeded the time limit for degree completion and who have not been granted a time extension will not be permitted to register in the School of Marine Science.

Required Courses

All students - By the end of a student’s second year in the School, the student either must be granted an exemption from or have passed core courses, MS 501, MS 502, MS 503, MS 504 and an approved course in statistics. In addition, each student must present a seminar to the marine science faculty, staff and students on the student’s thesis or dissertation research.

Students in biological oceanography - MS 628.
Students in marine fisheries science - MS 619.

Reading knowledge of one foreign language is required for either the M.A. or Ph.D. degree. Candidates for the doctorate who have passed a language examination for the master’s degree in the School of Marine Science need not take another language examination. Subfaculties and individual committees may adopt additional language requirements at their discretion.
The student may fulfill the language requirement by completing one of the following:

1. At least six (6) semester hours in one pertinent foreign language (German, French or Russian are recommended) at the college sophomore level or above with grade of C or better; or
2. Obtain a score no lower than the forty-fifth percentile in the Educational Testing Service Foreign Language Examination; or
3. Pass an examination administered by a member of the Department of Modern Languages who is competent in the language.

Students whose native language is not English may, with the permission of the Dean, use English to fulfill the foreign language requirement. Proficiency in the use of the English language may be demonstrated by the completion of twelve credit hours of formal class work with grades of B or higher in the School of Marine Science. Upon recommendation of the Academic Status and Degrees Committee of the faculty, the Dean may approve alternate methods.

Degree of Master of Arts

The steps to be accomplished and requirements for the degree are as follows:

1. As soon after initial registration as possible, the student must select a major professor, an advisory committee and a research project. The major professor, working with the committee, will prescribe the student’s program which will include the required courses.

2. The major professor and Advisory Committee, chosen by the student and approved by the Dean, direct the student’s program. The Advisory Committee consists of at least five members, the majority of which must be from the School of Marine Science. Committee members from outside of the School of Marine Science must possess the qualifications appropriate for status on the committee. For students with a concentration in biology or marine fisheries science, at least one of the members must be from the discipline of physical, chemical or geological oceanography. For students with a concentration in physical, chemical or geological oceanography, at least one member must be from the discipline of biological oceanography or marine fisheries science. For students with a concentration in marine resource management, one member must be from the discipline of physical, chemical or geological oceanography and at least one member from either the discipline of biological oceanography or marine fisheries science.

3. At least one year of each student’s program must be spent as a full-time resident student as defined in the general degree requirements presented above.

4. At least twenty-four semester credits of advanced work, of which at least one-half must have been earned in courses numbered 600 or above and with a grade average of B or better, are required for the M.A. degree. In addition, master’s students are required to register for at least six semester hours of MS 560 (Thesis). Thesis hours credited to a student in Research Graduate status (p. 36) above and beyond those for which they have paid may not be counted for the minimum number of thesis credits required for the degree.
Upon a favorable recommendation of the student's Advisory Committee and the Academic Status and Degrees Committee, followed by a majority vote of the faculty of the School of Marine Science and the approval of the Dean, a student may be admitted to candidacy after completion of the following requirements:

a. The student must have achieved a grade point average of B (3.0) or better, averaged over all courses taken for credit at the time of application for admission to candidacy.

b. All core courses required by the School of Marine Science, including MS 501, MS 502, MS 503, MS 504 and statistics, must be passed or officially exempted, and all other courses specifically required by the student's Advisory Committee must be completed.

c. The Language requirement and the comprehensive examination must be satisfactorily completed.

6. The student must present and defend a thesis on a topic approved by major professor, Advisory Committee and Dean. The defense of the thesis shall be separate from any other examination. The thesis must be submitted in final form to the College two weeks before the student expects to receive the degree. The degree will not be granted until 5 copies (approved and signed by the major professor and the committee and prepared for binding), one of which is the original, have been presented by the student to the authorities as required by the College. Detailed information regarding procedures for submission of the thesis should be obtained from the Office of the Dean.

7. All requirements for the degree must be completed within six calendar years after commencing graduate study. In exceptional cases, if recommended by the appropriate faculty committee, time extensions may be approved by the Dean.

Degree of Doctor of Philosophy

The steps to be accomplished and the requirements for the degree are as follows:

1. The student must select a suitable major professor, who must be a faculty member of the College, as soon as possible following admission. The student and the major professor will choose an Advisory Committee, which must be approved by the Dean. The major professor and Advisory Committee direct the student's program.

2. Course requirements will be established and approved by the student’s major professor, in cooperation with the Advisory Committee, and approved by the Dean.

3. The Advisory Committee, chosen by the student and approved by the Dean, must consist of at least five members, at least one of whom must be from outside the School of Marine Science. A majority of the committee’s members must be members of the faculty of the College, although persons with appropriate qualifications from outside the College may serve on the committee. For students with a concentration in biology or marine fisheries science, at least one member must be from the discipline of physical, chemical,
or geological oceanography. For students with a concentration in physical, chemical or geological oceanography, at least one member must be from the discipline of biological oceanography or marine fisheries science. For students with a concentration in marine resource management, at least one member must be from the discipline of physical, chemical or geological oceanography and at least one member must be from the discipline of biological oceanography or marine fisheries science.

4. A minimum of three years of graduate study beyond the baccalaureate is required. At least one academic year must be or have been spent in residence as a full-time M.A. or Ph.D. student of the College of William and Mary at either the Williamsburg or the Gloucester Point campus, or both, as defined in the general requirements above.

5. In addition to and separate from the comprehensive examination, the student must satisfactorily complete a qualifying examination to demonstrate factual and theoretical knowledge in the student’s field of specialization and in other subject areas as required by the student’s advisory committee.

6. Admission to candidacy is the same as listed in Degree of Master of Arts section except that the separate qualifying examination also must be satisfactorily completed.

7. The dissertation must be submitted to the College two weeks before the date of commencement.

8. Each candidate must successfully defend the dissertation in a final examination before it can be accepted by the College. This examination may be written or oral at the discretion of the School of Marine Science and shall be open to the faculty and to such outside persons as may be invited. This examination shall be separate from any other examination.

9. All graduate work in the School of Marine Science must be accomplished within seven calendar years after beginning work for the doctoral degree. In exceptional cases, if recommended by the appropriate faculty committee, extensions may be approved by the Dean.

10. All dissertations will be published by having a master microfilm negative made from each original dissertation. These negatives will be stored and serviced by "University Microfilms" of Ann Arbor, Michigan, and positive microfilms, or enlarged prints, will be produced to order at the standard rate for other scholars who desire access to any dissertation. Each dissertation, when submitted, must be accompanied by two copies of an abstract of not more than 350 words. This abstract, or summary, will be published in Microfilm Abstracts for national distribution. No dissertation will be accepted without this abstract. A fee for the above services must be paid by the candidate for the Doctor of Philosophy degree before it is conferred. All dissertation research should be planned, conducted and reported with a view toward publication of the results in a legitimate scientific journal.
FINANCIAL INFORMATION

TUITION AND FEES. The College reserves the right to make changes in its charges for any and all programs at any time, after approval by the Board of Visitors.

The tuition and general fee for full-time students in the School of Marine Science is $1,583 per semester for residents of Virginia and $4,196 per semester for others.

SPECIAL NOTE. Effective September 1, 1981, all incoming students registered for nine hours or more in 500-level courses or above, or for twelve hours or more at any level, will be considered full-time students and charged the full-time rates unless qualified to be a Research Graduate Student.

Tuition for part-time students, at both the undergraduate and graduate levels, is as follows:

- $100 per semester hour for Virginia students.
- $268 per semester hour for out-of-state students.

Regularly enrolled degree-seeking students of the College will be charged these rates during the regular session for part-time work, based on their established domiciliary status.

Rates for students who enroll in the Summer Session will be charged on the same basis.

Part-time students who are not regularly enrolled at the College of William and Mary, and for whom, therefore, no domiciliary status previously has been determined, will be charged on the basis of their satisfactorily established domiciliary status. (See statement regarding in-state, out-of-state classification for fee purposes).

Auditing fees are the same as those specified for part-time students, unless the auditor is a full-time student. Permission to audit must be obtained from the instructor.

RESEARCH GRADUATE STUDENTS. Upon the recommendation of a student's major professor and the Academic Status and Degrees Committee and approval of the Dean of the School of Marine Science, a student's eligibility for Research Graduate status would be established if the following conditions are met:

- The student has completed all required course work.
- The student is not employed significantly in any activity other than research and writing in fulfillment of degree requirements.
- The student is present on the campus or is engaged in approved field work.

While classified as a Research Graduate, a student may register for a maximum of 12 credit hours of Research or Thesis or Dissertation upon payment of the part-time rate for one credit hour.

A Research Graduate student is eligible for services (e.g. student health and athletic events) only if required fees are paid.
A Research Graduate student may take courses other than Research or Thesis or Dissertation only upon payment of the generally applicable additional part-time tuition.

ELIGIBILITY FOR IN-STATE TUITION RATE. To be eligible for the lower tuition rate available to in-state students, a student must meet the statutory test for domicile set forth in Section 23-7.4 of the Code of Virginia. Domicile is a technical legal concept, and a student’s status is determined objectively through the impartial application of established rules. In general, to establish domicile students must be able to show (1) that for at least one year immediately preceding the first official day of classes their permanent home was in Virginia and (2) that they intend to stay in Virginia indefinitely after graduation. Residence in Virginia primarily to attend college does not establish eligibility for the in-state tuition rate.

On admission to the College an entering student who claims domiciliary status is sent an application form and instructions on how to fill it out. The Office of the Registrar evaluates the application and notifies the student of its decision. A student re-enrolling in the College after an absence of one or more semesters must re-apply for domiciliary status and is subject to the same requirements as an entering student. A matriculating student whose domicile has changed may request reclassification of out-of-state to in-state; since reclassification is effective only prospectively, however, it must be applied for before the beginning of the academic semester. Any student may ask for written review of an adverse decision, but a change in classification will be made only when justified by clear and convincing evidence. All questions about eligibility for domiciliary status should be addressed to the Office of the Registrar.

PAYMENT OF ACCOUNTS. Charges for the tuition and general fee are payable in advance by the semester. Registration is not complete until all fees due the Treasurer's Office are paid. Any unpaid balance on an individual’s account could result in cancellation of registration. Remittance being made by check should be drawn to the College of William and Mary. Checks returned by the bank for any reason will constitute nonpayment of fees and will result in subsequent cancellation of registration.

REFUNDS TO STUDENTS WHO WITHDRAW FROM COLLEGE. Subject to the following regulations and exceptions, all charges made by the College are considered to be fully earned upon completion of registration by the student. Due to administrative procedures, refunds will not be processed until six (6) weeks after classes begin.

1. A student who withdraws within the first five-day period immediately following the first day of classes is entitled to a refund of all charges, with the exception of $50.00 which shall be retained by the College to cover the costs of registration, subject to Item No. 5, below. (Such refunds shall not include any deposits or advance payments which may have been required by the College as evidence of the student’s intention to enroll.)
2. A student who withdraws at any time within the next following 25 days after the first day of classes shall be charged 25% of the tuition and general fee, subject to Item No. 5 below.

3. A student who withdraws at any time within the second 30-day period after the first day of classes shall be charged 50% of the tuition and general fee, subject to Item No. 5 below.

4. A student who withdraws at any time after 60 calendar days following the first day of classes shall be charged the full tuition and general fee, subject to Item No. 5 below.

5. No refunds will be made to a student who has been required by the College to withdraw, regardless of the date of withdrawal.

6. No refunds will be made to a student who withdraws unofficially.

7. A registration fee of at least $50.00 will be deducted from the amount due and paid by a part-time student who withdraws within 60 calendar days immediately following the first day of classes, except in the case of an in-state student who is registered for only one credit hour. In such a case, the student will receive no refund.

If the total amount due and paid is more than $100.00, a maximum of 50% of the total will be refunded. The graduated refund policy noted for full-time students will not apply to part-time students.

No refund will be granted to a part-time student who withdraws after 60 calendar days immediately following the first day of classes; or who has been required by the College to withdraw, regardless of the date of withdrawal; or who withdraws unofficially.

At the graduate and/or law school level, a part-time student is one who is enrolled for eight (8) credit hours or less. An exception to this rule is noted in the Financial Information section.

CREDITS ON ACCOUNTS OF HOLDERS ON SCHOLARSHIPS. Students holding scholarships are required to pay all fees less the value of the scholarship which they hold. In cases where scholarships exceed total charges, refunds will be processed upon written request of the student beginning six (6) weeks after classes begin.

WITHHOLDING OF TRANSCRIPTS AND DIPLOMAS IN CASES OF UNPAID ACCOUNTS. Transcripts or any other information concerning scholastic records will not be released until College accounts are paid in full. Diplomas will not be awarded to persons whose College accounts are not paid in full.

Students may not drop a course after the last day of classes. If for medical reasons a student does not complete a course, "W" with appropriate notation will be entered on the record upon approval of the Dean and the appropriate authorities at the College.
ADMISSIONS

APPLICATION. Requests for application forms and completed application materials should be sent to:

Dean’s Office, Admissions
School of Marine Science
The College of William and Mary
Virginia Institute of Marine Science
Gloucester Point, Virginia 23062

Applications close each year for summer and fall terms on February 15, and for spring term on October 1. Successful applicants for summer and fall admission will be notified after March 15. Successful applicants for spring admission will be notified after November 7.

The following are required of applicants to the School of Marine Science:
1. Two (2) copies of the completed application form.
2. A non-refundable processing fee of $20.00. This fee is not credited to the student’s account. There is no fee application for admission as an unclassified (post-baccalaureate) student.
3. Three (3) letters of recommendation.
4. Official transcripts of all college work.
5. Scores of the Verbal and Quantitative sections of the Graduate Record Examination (GRE).

Scores in an Advanced section of the Graduate Record Examination in the applicant’s undergraduate major field or an area appropriate to the applicant’s proposed concentration in marine science are strongly recommended.

FOREIGN-EDUCATED STUDENTS. Additionally, foreign students must submit the results of the GRE English Language Proficiency Test, Test of English as a Foreign Language (TOEFL).

In order to expedite evaluation of records of foreign-educated students, the transcripts of college records must include titles of courses taken, the number of credits attempted and credits earned, and grades. Where transcripts do not give these details, they must be accompanied by an official statement explaining how the scholastic record may be compared to that of the College of William and Mary. Details must be given as to whether the courses are given on a semester basis (15 credits per semester, 30 per year, 120 for graduation), quarter basis (15 credits per semester, 45 per year, 180 for graduation) or other basis. In addition, the grading scale must be explained showing the grade equivalence in terms of A (highest) B, C, (passing), F (failing).

ADMISSION. Students are admitted as regular or provisional graduate students, or as unclassified students (post-baccalaureate). For admission as a regular graduate student, an applicant must have completed the requirements for a bachelor’s degree at an accredited college, with a record of high performance, and must have the recommendation of the appropriate committee and officials of the School. For direct admission of a doctoral student, an applicant must have an earned master’s degree or equivalent in an
appropriate field and the recommendation of the appropriate committee and officials of the School.

An applicant with a bachelor's degree and with a deficiency in some area may be admitted as a provisional student. A provisional student may be admitted to regular student status upon completion of requirements stipulated in their letter of admission. Application by a provisional student to regular status shall be reviewed by the Academic Status and Degrees Committee, using as criteria overall academic performance and any other performance standards specified on the student's admission to the School of Marine Science. Graduate credit earned by a provisional student is applied toward the graduate degree upon admission as a regular graduate student.

Applicants who have received a bachelor's degree from an accredited college or university and who wish to take courses in the College but not to enter a program for an advanced degree, may apply for admission as unclassified students (post-baccalaureate). Graduate credit earned by an unclassified student is applied toward the graduate degree upon admission as a regular graduate student.

Students, except unclassified students, are admitted to either the Master of Arts or Doctor of Philosophy program. A superior student whose original acceptance was to the master's program may petition for permission to bypass the master's degree and proceed directly toward the doctorate. The petition, which should be submitted to the Committee on Academic Status and Degrees, may not be submitted until the student has successfully completed the comprehensive examination and must have the support of student's advisory committee. At a minimum the student's advisory committee must demonstrate its support with a written statement that the student has begun work on a research project that the committee finds acceptable as the basis for a doctoral dissertation, and that it is the consensus of the committee that the student has demonstrated sufficient level of excellence to be allowed to proceed with work leading directly to the doctorate. After reviewing the petition and supporting documents, the Committee on Academic Status and Degrees will make a recommendation to the Dean as to whether or not permission to bypass the master's degree should be granted. Authority for the final decision rests with the Dean.

All cases of students completing an M.A. degree in the School of Marine Science and seeking to continue on in the Ph.D. program shall be reviewed and processed by the Admissions Committee.

GENERAL INFORMATION

FINANCIAL AID. Application for aid should be made on the application form for admission to graduate study. Awards are made on the basis of merit. Graduate assistants work an equivalent of twenty hours a week. They must satisfactorily carry out the duties assigned by the School of Marine Science, must make satisfactory progress on their programs as defined by the College degree requirements and the regulations of the School of Marine Science, and may not hold any other employment or appointment of a remunerative nature.
during the term of their assistantships without approval of the Dean of the School of Marine Science. Failure to comply with these conditions will lead to revocation of appointments.

For information regarding the College Work-Study, National Direct Student Loan, and Guaranteed Student Loan Programs, write to: Director of Student Financial Aid, The College of William and Mary, Williamsburg, VA 23185.

The Willard A. Van Engel Fellowship enables individuals of outstanding ability to do crustacean research and to pursue graduate study. The fellowship is a three-year appointment and becomes available when the current Fellow graduates. Inquiries as to the availability of the Fellowship should be directed to the Associate Dean of the School of Marine Science.

VIRGINIA WAR ORPHANS EDUCATION PROGRAM. The Virginia War Orphans Education Program provides educational assistance for children, or surviving children, of certain veterans or service personnel. To be eligible for assistance under this program, an applicant must meet the following basic eligibility requirements:

1. The applicant must be no less than sixteen years of age, or no more than twenty-five years of age.
2. One of the applicant’s parents must have served in the armed forces of the United States and must be permanently and totally disabled due to an injury or disease incurred in a time of war or other period of armed conflict; or
3. One of the applicant’s parents must have died as a result of injury or disease incurred in a time of war or other period of armed conflict; or
4. One of the applicant’s parents must be listed as a prisoner of war or missing in action.
5. The applicant’s parent, on which eligibility is based, must have been a resident of the Commonwealth of Virginia at the time of entry into active military duty; or
6. The applicant’s parent, on which eligibility is based, must have been a resident of the Commonwealth of Virginia for at least ten (10) consecutive years immediately prior to the date of application.
7. The applicant must provide written verification attesting to his or her acceptance as a student in either a state-supported secondary or post-secondary educational institution.

Eligible individuals are entitled to a maximum of forty-eight months of tuition-free education at state-supported educational or training institutions. Individuals entitled to this benefit may utilize it to pursue any vocational, technical, undergraduate, or graduate program of instruction. Generally, programs listed in the academic catalogs of state-supported institutions are acceptable provided they have a clearly defined educational objective, i.e. certificate, diploma or degree.

Requests for applications should be directed to the Director, Division of War Veterans’ Claims, Commonwealth of Virginia, 210 Franklin Road, S.W., Roanoke, VA 24011. If possible, applications should be submitted at least four months before the expected date of matriculation.
TRANSFER OF GRADUATE CREDIT. On the recommendation of the Academic Status and Degrees Committee and the approval of the Dean of the School, a regular student may apply up to six hours of graduate credit earned at another accredited institution of higher learning toward an advanced degree at William and Mary. The credits must have been earned in courses appropriate to the student's program in the School and must fall within the time specified by the general college requirements for degrees. Credit may be transferred only for courses in which the student received a grade of B or better and may not be counted in compiling his or her quality point average at William and Mary.

CHANGES IN REGISTRATION. All changes in students' schedules after the close of registration will be initiated through the School, and require approval of the instructors involved, the student's advisor or major professor, and the Dean. Students may not add courses after the last day for changes in registration as indicated in the calendar. If the student drops a course or courses before mid-semester but remains registered for other academic work, the course or courses dropped will be removed from the student's record. If the student drops a course or courses after mid-semester through the last day of classes but remains registered for other academic work, the grade of "W" or "F" will be awarded by the instructor in the course depending upon whether or not the student was passing at the time the course was dropped.

If the student withdraws from the College before mid-semester, a grade of "W" will appear on the record for each course in progress at the time of withdrawal. After mid-semester through the last day of classes, students who withdraw from the College will be awarded a "W" or "F" by the faculty member teaching each course in progress at the time of the withdrawal.

EXAMINATIONS. The examinations, given at the end of each semester, take place at the times announced on the examination schedule. Students are required to take all of their examinations at the time scheduled unless excused by the instructor or Dean on account of illness or other sufficient reason. Whenever possible, students must make their request to be excused from an examination in advance of the examination. Permission to take a deferred examination must be obtained from the instructor and the Dean. Students excused from an examination will have "I" entered on the record until they make up the examination. Deferred examinations must be made up by the end of the following semester.

THE HONOR SYSTEM is one of the College's most treasured traditions. Every student at the College is bound by its tenets, which are at the basis of all scholarship. The Graduate Student Association administers the system for graduate students of the School of Marine Science. The principles of the Honor System and the method of administration are described in the Student Handbook.
SEXUAL HARASSMENT. The following policy statement on sexual harassment has been approved "in spirit" by the faculty of marine science of the College:

Every member of the College community has the right to work, study, teach and conduct research in an environment free from sexual pressure of any kind. Sexual harassment is an infringement on that right and will not be tolerated in any form.

On the other hand, the College recognizes that interpersonal rapport between students and faculty is a natural and desirable aspect of the college experience. Faculty should be aware, however, that a situation in which they have a dual relationship with a student—a professional as well as a less formal relationship—has the inherent potential for exploitation. Particularly astute judgment should be exercised when a faculty member is in a position to give grades, letters of recommendations or grants to a student with whom he or she also has a less formal relationship. In the view of the College, the above described dual relationship is clearly subject to exploitation due to the power imbalance involved.

Any student with a grievance within this policy should first inform immediately the offending party of the unwelcome character of the behavior. If the behavior persists, or if there are any apparent reprisals, the student should inform the relevant department chairman or dean who, within standing procedures governing imposition of sanctions for misconduct of a faculty member, is charged with responsibility for making inquiries and, if the evidence warrants it, prosecuting the matter within stipulated Faculty Handbook procedures.

For a student who believes he or she may have been sexually harassed but is uncertain as to whether a complaint is justified or whether he or she wishes to initiate a formal grievance, it may be helpful to discuss his/her concerns confidentially and informally with the Director of Equal Opportunity and Affirmative Action Programs or with a staff member of the Center for Personal Learning and Development.

SUBMISSION OF THESES AND DISSERTATIONS. Detailed procedures regarding submission of theses and dissertations and payment of binding fees may be obtained from the Dean's Office.

NOTICE OF CANDIDACY FOR GRADUATION. Candidates for advanced degrees must submit a Notice of Candidacy for Graduation to the Registrar at the beginning of the semester in which they expect to receive the degree. If they subsequently fail to complete the requirements, they must cancel the notice at least two weeks before the date of Commencement and must resubmit the notice in whatever semester they complete the requirements.

SYSTEM OF GRADING AND QUALITY POINTS. The grades A (excellent), B (good), C (satisfactory), P (pass), in certain courses, D (unsatisfactory), and F (failure) are used to indicate the quality of work in a course. "W" indicates that a student withdrew from the College before
mid-semester or dropped a course between mid-semester and the last day of
class and was passing at the time that the course was dropped.

For each semester credit in a course in which a student is graded A, 4 quality
points are awarded; B, 3; C, 2. P carries credit but is not included in a student’s
quality point average; D and F carry no credit but the hours attempted are
included in the student’s average.

In addition to the grades A, B, C, P, D, F, and W, the symbols "G" and "I" are
used on grade reports and in the College records. "G" indicates that the
instructor has deferred reporting the student’s grade since there is not
sufficient evidence on which to base a grade.

"I" indicates that because of illness or other major extenuating
circumstances, the student has postponed, with the explicit consent of the
instructor, the completion of certain required work. In case of absence from
the final examination for reasons of illness or other good grounds, "I"
automatically becomes "F" at the end of the next semester if the postponed
work has not been completed.

A student will be placed on probation for: receipt of a grade below a C
(<2.0); a cumulative average less than a B (<3.0).

Probation will last until a student’s cumulative average is raised to at least
a B (3.0) and in no circumstances longer than one calendar year.

If, during probation, the student receives a grade less than C (<2.0), receives
a semester average less than a B (<3.0), or fails to raise cumulative average to
at least a B (3.0), the penalty would be automatic dismissal from the School of
Marine Science, with the possibility of appeal to the Academic Status and
Degrees Committee for reinstatement.

HEALTH SERVICE. The objective of the Health Service is three-fold: (1)
improvement of the health of the student, (2) prevention or treatment of
diseases, and (3) instruction of students in matters essential to healthful living.

The Health Service is housed in the new Student Health Center, a modern,
fireproof building containing an out-patient clinic, a dispensary and waiting
room, a kitchen and a 14-bed in-patient facility.

A personal health history and complete physical examination form is
required of all entering students. During each semester, each student who has
(1) paid the health service fee (which is included under "general fees"), and (2)
filed his or her completed Health Form with the Director is entitled to the use
of Health Service facilities. Graduate students carrying at least nine credits a
semester are eligible by virtue of having paid the Health Service Fee under the
aforementioned "general fees." Graduate students carrying fewer than nine
credits a semester are eligible if they are certified by the Dean of Graduate
Studies, Arts and Sciences, as "full-time equivalent" students and pay the
Health Service Fee. The medical services are as follows:

1. Medical care in the Health Service Clinic for most illnesses and accidents.
   Necessary dressings are included as much as possible. Drugs are sold at
   nominal cost to the student.

2. Health consultation service with the medical staff during those days that
   school is formally in session.
3. Special medical examinations for certification for participation in inter-collegiate athletics and other forms of strenuous activity sponsored by the school.

4. Hospitalization in the Health Service Center for a limited period of illness when advised by one of the college physicians. The College does not, however, assume the cost of special care nurses, consulting physicians where needed (including psychiatric care), surgical operations, X-rays, and any laboratory procedures that cannot be done directly by the Health Service facility. Also, care in other hospitals and certain special medications that are not stocked in the Health Service pharmacy are the responsibility of the student or his family or his or her supplementary insurance coverage. Meals while in the infirmary are charged the student at the prevailing dining hall rate.

5. A special group insurance to help cover some of the cost of these "extra-Health Service" costs is available through the carrier's local agent, Savage and Wood Agency, 1101 Richmond Rd., Williamsburg (804) 229-1294. Graduate students are strongly urged to consider this coverage as they most often find in times of need that they have inadequate coverage otherwise.

The College Health Service provides the services listed above, but it lacks facilities for prolonged or specialized care. It can offer some postoperative care at the discretion of the operating surgeon and where it is to the advantage of the student financially and academically.

Students who have legitimate medical reasons will be permitted to withdraw from the College for those reasons without prejudice to their academic records.

All relationships between student and physicians are confidential, and at no time do the results of diagnosis and treatment become part of a student's permanent college record. No information concerning an individual's contact with the Health Service will be released without his or her written permission. At the same time, we would encourage a free interchange of information between the physician and the student in both directions on any matter regarding his or her health.

THE CENTER FOR PERSONAL LEARNING AND DEVELOPMENT offers professional assistance with psychological problems, problems of social relationships and the understanding of oneself and others. These services are offered to students through individual psychotherapy, group psychotherapy, and personality testing and assessment. With the exception of national test services, the services are free of charge to students. Center staff members include male and female, full- and part-time clinical psychologists. All are highly trained and widely experienced in dealing with the problems of college students. Staff members work with the clients on an individual, couple, family, or group basis depending on the needs of the individual client. Appointments with a staff clinician are made within one to seven days after the initial request depending on the urgency of the problem and the staff time available. Appointments may be made by coming in person to the Center for Personal Learning and Development, or by telephone. Depending on the nature of the problem, a client may participate in individual and/or group psychotherapy. Clients may also be administered psychological tests or
referred to other sources of help when appropriate. Testing is never done routinely but only after a discussion and exploration of the problem area with the client.

No information concerning an individual’s contact with the Center will be released without the written permission of the client. At no time do the results of counseling or psychotherapy become a part of the student’s permanent college record, and reports are never submitted to parents, College authorities, or potential employers unless requested in writing by the client.

In addition to testing, which is sometimes a part of the counseling process, the Center for Personal Learning and Development serves as a regional testing center for certain nationally administered examinations. Among these are the Graduate Record Examination, the Law School Admission Test, and the Medical College Admission Test. The Center also administers the Miller Analogies Test throughout the year to students applying to graduate school. Application forms and additional information concerning these examinations can be obtained at the Center.

The Center for Personal Learning and Development is not only for people with “problems” or people who have difficulty adjusting to college life. All students, including the highly successful student, often find significant benefits in counseling as a means of increasing self-awareness, maximizing potentials, and helping make the college experience more productive and meaningful.

SERVICES NOT PROVIDED. As a matter of policy, the Center for Personal Learning and Development does not deal with the following:

1. Medical problems or instances when drugs must be prescribed. In such cases, the student would be referred to the College Health Service. Of course, there are many cases where a student’s psychological and medical problems are related and in such instances the Center may work cooperatively with the College Health Service.

2. Approving class schedules or helping with course selection. These services are generally provided by faculty advisors.

3. Job placement, part-time or summer work. In such instances, students would be referred to the Directors of Student Aid and Placement.

4. Remedial programs in reading, mathematics, English, etc. In some cases other College agencies can provide these services.

5. Vocational counseling, career counseling is handled by the Office of Career Counseling in Morton Hall.