

# OCEAN

UNDERGRADUATE DEGREE PROGRAMS  
AT THE UNIVERSITY OF WASHINGTON

# G R A P H Y



2008-2009





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## THE SCIENCE OF OCEANOGRAPHY



Nearly three quarters of the earth's surface is covered by ocean - the oceans influence climate and are host to both the largest and smallest organisms on the planet. Oceanography is the study of the marine environment and its interactions with the earth, the biosphere, and the atmosphere. The study is prompted both by the intellectual desire to understand how the oceans operate and how life develops in a salty, cold environment, and the need to wisely use the ocean's resources for the benefit of humanity. Oceanography is an interdisciplinary science integrating the basic principles of biology, chemistry, geology, physics, geophysics, mathematics, botany, zoology, meteorology, and geography.

Oceanography is a young science, only decades old as an integrated field of study. Its realm is thought to be the oldest, indeed where life began. The difficulties involved in exploration have made the oceans earth's last great frontier. Applications of high technology to oceanographic instrumentation and vessels, increasingly sophisticated computers, satellite remote sensing, and innovative methodologies are rapidly opening new possibilities for exploration and research.

The UW Oceanography undergraduate curriculum is divided into four areas of emphasis:

**BIOLOGICAL OCEANOGRAPHY** examines the processes governing the distribution, abundances, and production of plants, animals, and nutrients in the oceanic ecosystem. Emphasis is on investigations of bacteria, phytoplankton, zooplankton, and benthic organisms. Progress entails identifying the patterns of variability in space and time, determining the processes producing and maintaining the patterns, then quantifying the processes.

**CHEMICAL OCEANOGRAPHY** investigates the complex chemistry, distribution and cycling of dissolved substances, nutrients, and gases in seawater, the mechanisms controlling them and their origins and fates.

**MARINE GEOLOGY & GEOPHYSICS** studies marine sediments (their formation, transport, and deposition); ocean basin formation (plate tectonics); processes governing shoreline formation; and the origin, structure, and history of the oceanic crust and upper mantle.

**PHYSICAL OCEANOGRAPHY** endeavors to understand and predict motion in the sea. Scales of motion range from millimeters through tidal and current scales to the great ocean gyres. The distribution of physical properties (temperature, salinity, sea ice) and air-sea interaction and its implications for climate are fertile areas of research.





*“During my junior and senior years, I was given the opportunity to work for two professors. I was taught the technical procedures of sample and data analysis, and exposed to everything else that goes into the execution of a successful research project. I learned about planning, management, instrumentation, data quality, and the reality of field work and lab analysis. I learned first hand that things do not always go as planned and that flexibility and patience are very valuable tools. I now use those lessons that I learned every day. My experience in the School of Oceanography served as an excellent springboard into a career in physical oceanographic consulting.”*

-- Kari Sauers, (left in photo with Jessi Satterberg – both from the class of 2001). Since graduating, Kari has studied currents off the coast of Nigeria and in the Gulf of Mexico for major oil companies, and currents in Puget Sound for King County Department of Natural Resources. She works as an oceanographer at Evans-Hamilton, Inc.

## THE SCHOOL OF OCEANOGRAPHY

The School of Oceanography at the University of Washington offers outstanding instructional and research opportunities to undergraduates. Located by Portage Bay on the University of Washington campus, the School has 60 faculty, 90 support staff, and ~90 undergraduate and ~75 graduate students. The School is part of the College of Ocean and Fishery Sciences, the largest university-based oceanographic research and education center in the world. We are the only program in the USA that offers a full suite of degrees from the bachelor's degree to the PhD.

Research and teaching in the School are designed to better understand oceanic systems and the possible consequences of human activities on the marine environment. Members in the School are active in more than 140 projects with annual departmental expenditures in excess of \$20 million. Projects span the globe. The School's research program adds an important dimension to the undergraduate curriculum. Our faculty conducts research at the leading edge of the oceanographic field. Currently 70% of our undergraduates are employed in the School's research programs and work directly with our faculty.



The School operates two research vessels, the 274-foot R/V Thomas G. Thompson and the 65-foot R/V Clifford A. Barnes.

The vessels accommodate the School's blue water and estuarine research programs, and both ships are actively used to support the undergraduate program. The School operates extensive laboratory facilities equipped with highly-specialized instruments and computers for instruction and research. The University's Friday Harbor Laboratories on San Juan Island in Puget Sound are also utilized for instruction and research.

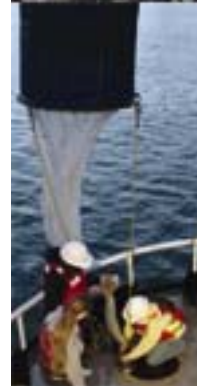
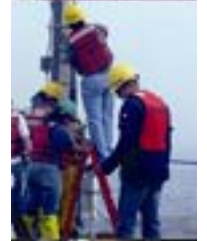
Our Student Services Office is staffed by an academic counselor and the associate director of the School. Faculty advisers also discuss students' developing scientific interests. Together they assist students in designing their programs of study and planning for a career and/or graduate education.



The Student Oceanographic Society (SOS) provides peer advice and support for ocean undergraduates. SOS organizes field trips and society gatherings to strengthen the undergraduate oceanography community. You can check out

SOS happenings on the web at:

<http://www.ocean.washington.edu/academics/sos/index.html>



# CAREERS IN OCEANOGRAPHY

Oceanography bachelor degree recipients have a wide variety of job opportunities. The School strives to help students develop a systematic and synoptic form of thinking, creating graduates with the ability to think broadly. Our curriculum stresses quantitative approaches to environmental challenges, hands-on experience and the problem-solving skills needed to not only frame questions but answer them.

The broad scope of our program allows students to tailor their studies in a variety of ways and to a variety of means. 86% of our alumni enter the field of marine research immediately upon graduation. Our alumni are employed in the following fields, and more:

- Environmental Consulting
- Education (K-12 and Universities)
- Forensic Sciences
- Meteorology
- Water Quality Control & Monitoring
- Commercial Diving
- Research & Engineering
- Marine Ecological Research
- Underwater Videography
- Industrial Chemistry

The School's undergraduate program is ideally suited to help people create a career path in the marine sciences. Oceanographers are typically employed in research, both pure and applied. The goal is to produce a new understanding of environmental systems and to explore the potential consequences of human activities. Oceanographers are involved in sample and data collection, analyses and interpretation, and preparation and dissemination of results. Oceanographers work at sea, on land, in laboratories, and at computers. The profession may be entered with a Bachelor's, Master's, or Doctoral degree -- the more advanced the degree, the greater the level of responsibility for initiating, designing, and executing a scientific research project.

Most oceanographers are employed in educational and research institutions, or in government agencies such as the National Oceanic and Atmospheric Administration, U.S. Geological Survey, Office of Naval Research, U.S. Department of Interior, U.S. Coast Guard, and National Marine Fisheries Service. Other employers include state and local governments in coastal areas and independent consulting firms doing research for private companies and government agencies.

An oceanographer's duties are diverse. Data are most often collected at sea or from inland waters, but are usually processed and analyzed in laboratories and offices, often involving the use of highly-specialized instruments and computers. Oceanographers experience the exhilaration and rigors of new discoveries made at sea, and return to home port for months of data processing, computer programming, analysis, and writing, budgeting, planning, and conferring. The work is rewarding and tedious, fascinating and frustrating.

Career opportunities are open to both women and men. Currently, more than 55% of the oceanographers in training are women. As most oceanographers are employed in the public sector, pay scales reflect current compensation rates for scientists. Statistics published in 2005 by the American Geophysical Union suggest that the average salary in the public sector for persons with an oceanography undergraduate degree is \$53,000 per annum. Oceanographers often travel around the world as part of their research and express a high degree of job satisfaction.



# APPLICATION INFORMATION FOR PROSPECTIVE STUDENTS

**HIGH SCHOOL PREPARATION.** High-school students considering Oceanography as a career should have a strong record in science and mathematics. Students must meet the general University entrance requirements, which may be obtained from the Office of Undergraduate Admissions or your high school counselor.

**TRANSFERRING INTO THE SCHOOL OF OCEANOGRAPHY.** The first two years of study include required courses in the basic sciences, courses to satisfy the University's proficiency requirement, and Areas of Knowledge credits. Many of these courses are available at accredited two-year and four-year colleges, making it possible to transfer to the University of Washington and the Oceanography program as a junior. Transfer Guides, which list course offerings and their UW equivalents, are available for all Washington two- and four-year colleges. Students should attempt to complete one year each of calculus, calculus-based physics, and general chemistry before they transfer to UW. Introductory oceanography courses taken at community colleges typically transfer to UW and count toward the degree.

**ADMISSION TO THE UNIVERSITY OF WASHINGTON.** Admission is competitive, particularly for out-of-state applicants. If you are interested in Oceanography, you should strive for scholastic excellence in your high school and/or early college career. For more information, contact the Office of Undergraduate Admissions, 320 Schmitz Hall, Box 355840, (206) 543-9686, or (<http://www.washington.edu/students/admissions.html>). Admission packets and application forms may be requested on a 24-hour Voice Mailbox, (206) 543-5150, or by email at [askuwadm@u.washington.edu](mailto:askuwadm@u.washington.edu).

**ADMISSION TO THE SCHOOL OF OCEANOGRAPHY.** Students may enter the program directly upon admission to the University. The School has no separate admission requirements.

**VISITING THE SCHOOL OF OCEANOGRAPHY.** You are welcome to visit the University and the School to explore educational opportunities, attend representative classes, tour the campus, examine the University's facilities, and obtain pre-admission counseling and advising. For arrangements contact the Student Visitation Program at the Office of Undergraduate Admissions.

**FINANCIAL AID.** Students with outstanding academic records should consult with high school counselors for information on scholarships. Need-based financial aid, student loans, and scholarship information and applications are available from the Office of Student Financial Aid, 105 Schmitz Hall, Box 355880, (206) 543-6101, [osfa@u.washington.edu](mailto:osfa@u.washington.edu).

The School of Oceanography maintains several scholarships for undergraduates. Check our web site for application dates and information packets. Scholarship applications are typically offered in February and winners are announced in March or April. For more information, email [student@ocean.washington.edu](mailto:student@ocean.washington.edu).

**HOUSING.** Information on University housing is available from the Housing and Food Services Office, 301 Schmitz Hall, Box 355842, (206) 543-4059, [hfsinfo@u.washington.edu](mailto:hfsinfo@u.washington.edu). Off-campus housing to suit all tastes and budgets is available in the adjacent residential areas.



*"Oceanography exposed me to the wonders of the environment, and allowed me to blend my interests in mathematics, physics and computers with my passion for the natural world. Faculty members are experts in their fields and provided me with opportunities to practice oceanography as well as to study it."*

*--Lauren Curry, class of 2005*



# UNDERGRADUATE DEGREE REQUIREMENTS

**A total of 180 credits is required for each baccalaureate degree.**

The School of Oceanography's undergraduate program is designed to broadly prepare students to enter the many fields of environmental sciences, to prepare students to directly enter the oceanographic profession, and to prepare students for graduate studies in oceanography and engineering. Students begin the program by acquiring a basic knowledge of mathematics, physics, biology, geology, and chemistry. These tools are then applied within Oceanography at increasingly complex levels. During the course of study students engage in field work and receive practical experience learning sampling techniques with specialized instruments of oceanography research. In addition, students learn how to collect, analyze and interpret data using complex computer software packages, and to prepare reports. Both Bachelor of Arts and Bachelor of Science degrees are offered. The BA is designed for maximum flexibility, and is suited for students who wish to enter into the field of environmental education (K-12). The School of Oceanography and the College of Education maintain close ties and offer complementary course work for students wishing to obtain both a BA in oceanography and a BA in education with a WA state teaching certificate. The BS is designed for students wishing a more specialized and quantitative education in oceanography.

## BASIC SCIENCE CORE COURSES (52-66 Credits):

Oceanography majors must complete **one class or course sequence in each of the five course disciplines that comprise oceanography**. Numbers in parentheses following the course title indicate the credit hours. The quarter(s) in which the course is offered follows: **A**utumn, **W**inter, **S**ummer. For more detailed course information go to <http://www.washington.edu/students/crscat>.

Course Titles	UW Course Numbers (only one sequence need be taken)	Prerequisites
<b>MATH</b>		
Calculus and Analytic Geometry	*MATH 124, 125, 126 (5,5,5) AWSpS	2.5 in MATH 120 or place out
Calculus for the Life Sciences	MATH 144, 145, 146 (5,5,5) AWSp	2.5 in MATH 120 or place out
Analysis for Biologists	QSCI 291, 292, 381 (5,5,5,) AWSp	MATH 120 or place out
<b>PHYSICS</b>		
Calculus-Based Physics	*PHYS 121, 122, 123 (5,5,5) AWSpS	MATH 124, 125, 126**
Algebra-Based Physics	PHYS 114, 115, 116 (4,4,4) AWSpS	One year of high school physics
<b>BIOLOGY</b>		
Introductory Biology	BIOL 180, 200 (5,5) AWSpS BIOL 220 (5) highly recommended	CHEM 152 for BIOL 200 and 220
<b>GEOLOGY</b>		
	(one of these two courses)	
Physical Geology	*ESS 210 (5) A	None
Introduction to Geological Sciences	ESS 101 (5) AWSp	None
<b>CHEMISTRY</b>		
General Chemistry	CHEM 142, 152 (5,5) AWSpS	None

\* sequences with asterisks are recommended

\*\* MATH 124-126 may be taken concurrently with PHYSICS 121-123

## REQUIRED OCEANOGRAPHY COURSES (39 Credits)

**OCEAN 200 Introduction to Oceanography (3) Sp** Description of the oceans. Emphasis on the relations of biology, chemistry, geology and physics in marine environments. Examination of relationships and interactions at macro-, meso- and microscales in the ocean.

**OCEAN 210 Ocean Circulation (3) A** The large-scale circulation of the ocean. Topics include temperature-salinity analysis; water mass identification; water, salt and heat budgets; chemical tracer distributions; advection and diffusion. Prerequisite: either Ocean 101, Ocean 200, or OCEAN 250/BIOL 250/FISH 250; recommended: either PHYS 114 or PHYS 121.

**OCEAN W-220 Introduction to Field Oceanography (3) Sp** Methods of oceanographic field study. Instruments and sampling techniques. Writing assignment to teach report-writing skills. Prerequisite: either OCEAN 200 or OCEAN 250; recommended: OCEAN 210.

**OCEAN 400 Chemical Oceanography (4) W** Physical and chemical properties of seawater and marine products; processes determining chemical makeup of oceans. Prerequisite: CHEM 152, OCEAN 210.

**OCEAN 410 Marine Geology & Geophysics (4) A** Sedimentological and petrologic processes that determine the geologic record. Prerequisite: ESS 101 or 210.

**OCEAN 420 Physical Processes in Oceanography (4) W** Physical properties and processes; theories and methods describing ocean currents, waves and tides. Prerequisite: either PHYS 116 or PHYS 123; either MATH 126, MATH 129, MATH 146 or QSCI 293; OCEAN 210.

**OCEAN 430 Biological Oceanography (4) A** Marine organisms, their quantitative distribution in time and space and their interactions with the ocean. Prerequisite: either BIOL 162 or BIOL 200; OCEAN 210; recommended BIOL 220.

**OCEAN 401, 411, 421, or 431 Topics in Oceanography (3) Sp** Specialized topics in Oceanography. Various techniques in solving oceanographic problems. For students with senior standing.

**OCEAN 442 Oceanography of Puget Sound (3) A** Explore the role of oceanography in regional issues. Field opportunities and active investigation of applied oceanographic problems. Prerequisite: either CHEM 221, BIOL 220 or ESS 210; and OCEAN 430.

**OCEAN 443 Design of Oceanographic Field Experiments (3) W** Case histories, presentations, and class exercises used to teach methods of formulating a research problem and proposal writing. Methods of data analysis, presentation, error estimation, library resource and data base use; web page implementation and design. Principles of cruise planning. Prerequisite: OCEAN 400; OCEAN 410; OCEAN 420; OCEAN 430; OCEAN 442.

**OCEAN W-444 Oceanic Data Interpretation (5) Sp** Conduct field experiment (designed in OCEAN 443) during week-long cruise aboard a research vessel. Analyze samples/data and present results in a series of drafts and a final term paper. Results are also presented at a two-day-long public research symposium and on the students' individual web sites. Prerequisite: OCEAN 443

## OTHER REQUIREMENTS (up to 75 Credits)

**UPPER-DIVISION SCIENCE (20 Credits)** A minimum of twenty credits of upper-division credits in Science, Mathematics, or Engineering is required for a B.S. degree; the B.A. requires ten. These courses are selected by students in consultation with an adviser, and are intended to provide flexibility to accommodate a student's developing interests within the broad field of oceanography. Examples are listed below for each concentration.

**LANGUAGE SKILLS (5 Credits)** Five credits of English composition with a grade of 2.0 or higher is required. A foreign language is not required.

**AREAS OF KNOWLEDGE (40 Credits)** This requirement is intended to develop breadth of knowledge and appreciation for subjects outside the scope of Oceanography. Students must complete 20 credits each in the Visual, Literary, and Performing Arts (Humanities) and Individuals and Society (Social Sciences). See page 13 for suggestions.

**W-COURSES -- WRITING (10 Credits)** Students must complete ten credits of courses that emphasize the development of writing skills within the context of an academic discipline. There are 8 W-Credits for Oceanography majors in the curriculum: OCEAN W-220 and W-444.

**MINORS (Optional)** Minors (25-35 credits) may be related to your major (e.g. Chemistry, Mathematics, Atmospheric Sciences, Fisheries), or in separate area of interest (e.g. History, Dance, Music, foreign languages). The course work may also satisfy requirements for Upper-Division Science and/or Areas of Knowledge.

## COMMON UPPER-DIVISION SCIENCE COURSE SELECTIONS

### COUNT FOR ALL OPTIONS

OCEAN 355 (3) From the Big Bang to the Blue Planet

OCEAN 360 (10) Marine Field Research

OCEAN 365 (8) Practicing Sustainability Science

OCEAN 423 (3) Ocean Circulation and Climate

OCEAN 450 (4) Climatic Extremes

OCEAN 451 (4) Fluid Dynamics Laboratory

OCEAN 452 (3) Spatial Information Technologies in Ecosystem Sciences

OCEAN 454 (3) Hydrothermal Systems

### BIOLOGICAL OCEANOGRAPHY

BIOL 330 (5) Natural History of Marine Invertebrates

BIOL 427 (5) Biomechanics

BIOL 432 (9) Marine Invertebrate Zoology (Summer Quarter at FHL)

BIOL 434 (5) Invertebrate Zoology

BIOL 448 (3) Marine Algal Ecology

Most upper division SAFS (FISH) courses

### CHEMICAL OCEANOGRAPHY

CHEM 237 (4), 238 (4), 239 (3) Organic Chemistry

CHEM 455 (3), 456 (3), 457 (3) Physical Chemistry

### MARINE GEOLOGY & GEOPHYSICS

ESS 212 (5) Earth Materials and Processes

credits can count toward UD courses for a B.S.

ESS 311 (5) Geochemistry, ESS 312 (5) Geomechanics,

ESS 313 (5) Geobiology

ESS 403 (3) Global Geophysical

### PHYSICAL OCEANOGRAPHY

AMATH 401 (3), 402 (3), 403 (3) Methods in Applied Mathematics I, II, III

MATH 308 (3) Linear Algebra

MATH 324 (3), 326 (3) Advanced Calculus I and II

PHYS 224 (3) Thermal Physics, PHYS 225 (3) Modern Physics

ATM S 301 (5) Introduction to Atmospheric Sciences

Q SCI 381 (5) Intro to Probability and Statistics

MATH and AMATH courses except AMATH 301

BIOL 401 (5) Cell Biology

BIOL 430 (8) Marine Zoology and BIOL 445 (8) Marine Botany (Spring Quarter at FHL)

BIOL 433 (5) Marine Ecology

BIOL 446 (5) Biology of Algae

BIOL 470 (3) Biogeography

GENETICS and BIOCHEM upper division courses

CHEM 321 (5) Quantitative Analysis

CHEM 460 (3) Spectroscopic Molecular Identification

ESS 213 (5) Evolution of the Earth

ESS 211 (5) Physical Processes of the Earth  
If 211, 212 and 213 are taken

ESS 315 (4) Environmental Geology

ESS 450 (4) Principles of Paleobiology

MATH 307 (3) Differential Equations

MATH 309 (3) Partial Differential Equations

MATH 390 (3) Statistics & Probability for Scientists

PHYS 227 (3), 228 (3) Elementary Mathematical Physics I and II



**\*\*This is not an exhaustive list. If you are interested in a course that is not on this list, please ask Michelle Townsend ([mtown@ocean.washington.edu](mailto:mtown@ocean.washington.edu)) if it can be used toward your upper division credit.**

# SUGGESTED 4-YR COURSES OF STUDY

This is intended only as a guide. An academic counselor will work with you to determine your best course of study.

## Biological Oceanography

	Autumn		Winter		Spring	
<b>1st Year</b>	Math *	5	Math	5	Math	5
	Chem 142	5	Chem 152	5	Ocean 200/201	3/2
	Engl. Comp	5	VLPS/I&S	5	Biol 180	5
	Ocean 100	1				
		<b>16</b>		<b>15</b>		<b>13/15</b>
<b>2nd Year</b>	Ocean 210	3	VLPA/I&S	5	Ocean 220	3/5
	Physics *	5	Physics	5	Physics	5
	Biol 200	5	Biol 220	5	ESS 101	5
	VLPA/I&S	2				
		<b>15</b>		<b>15</b>		<b>13/15</b>
<b>3rd Year</b>	Ocean 410	4	Ocean 400	4	Ocean 431	3
	Ocean 430	4	Ocean 420	4	U/D Science	5
	VLPS/I&S	7	VLPS/I&S	7	VLPS/I&S	7
		<b>15</b>		<b>15</b>		<b>15</b>
<b>4th Year</b>	Ocean 442	3	Ocean 443	3	Ocean 444	5
	U/D Science	5	U/D Science	5	U/D Science	5
	VLPA/I&S	7	Electives	6	Electives	5
		<b>15</b>		<b>14</b>		<b>15</b>

\* Choose one of the sequences listed in the Basic Science Core Courses.

## Marine Geology & Geophysics Oceanography

	Autumn		Winter		Spring	
<b>1st Year</b>	Math 124	5	Math 125	5	Math 126	5
	Chem 142	5	Chem 152	5	Ocean 200/201	3/2
	Engl. Comp	5	VLPS/I&S	5	Biol 180	5
	Ocean 100	1				
		<b>16</b>		<b>15</b>		<b>13/15</b>
<b>2nd Year</b>	Ocean 210	3	ESS 101	5	Ocean 220	3/5
	Phys 121	5	Phys 122	5	Phys 123	5
	Biol 200	5	VLPA/I&S	5	VLPA/I&S	5
	VLPA/I&S	2				
		<b>15</b>		<b>15</b>		<b>13/15</b>
<b>3rd Year</b>	Ocean 410	4	Ocean 400	4	Ocean 411	3
	Ocean 430	4	Ocean 420	4	U/D Science	5
	U/D Science	5	U/D Science	5	VLPS/I&S	7
	VLPA/I&S	2	VLPA/I&S	2		
		<b>15</b>		<b>15</b>		<b>15</b>
<b>4th Year</b>	Ocean 442	3	Ocean 443	3	Ocean 444	5
	U/D Science	5	U/D Science	5	Electives	10
	VLPA/I&S	7	VLPA/I&S	6		
		<b>15</b>		<b>14</b>		<b>15</b>

# SUGGESTED 4-YR COURSES OF STUDY

## Physical Oceanography

	Autumn		Winter		Spring	
<b>1st Year</b>	Math 124	5	Math 125	5	Math 126	5
	Chem 142	5	Chem 152	5	Biol 180	5
	Engl. Comp	5	VLPS/I&S	5	Ocean 200/201	3/2
	Ocean 100	1				
		<b>16</b>		<b>15</b>		<b>13/15</b>
<b>2nd Year</b>	Ocean 210	3	ESS 101	5	Ocean 220	3/5
	Phys 121	5	Phys 122	5	Phys 123	5
	Biol 200	5	VLPA/I&S	5	VLPA/I&S	5
	VLPA/I&S	2				
		<b>15</b>		<b>15</b>		<b>13/15</b>
<b>3rd Year</b>	Ocean 410	4	Ocean 400	4	Ocean 422 or 423	3
	Ocean 430	4	Ocean 420	4	U/D Science	5
	U/D Science	5	VLPS/I&S	7	VLPS/I&S	7
	VLPS/I&S	2				
		<b>15</b>		<b>15</b>		<b>15</b>
<b>4th Year</b>	Ocean 442	3	Ocean 443	3	Ocean 444	5
	U/D Science	5	U/D Science	5	Electives	10
	VLPA/I&S	7	Electives	6		
		<b>15</b>		<b>14</b>		<b>15</b>

## Chemical Oceanography

	Autumn		Winter		Spring	
<b>1st Year</b>	Math *	5	Math	5	Math	5
	Chem 142	5	Chem 152	5	Chem 162	5
	Engl. Comp	5	VLPS/I&S	5	Ocean 200/201	3/2
	Ocean100	1				
		<b>16</b>		<b>15</b>		<b>13/15</b>
<b>2nd Year</b>	Ocean 210	3	Biol 180	5	Biol 200	5
	Physics *	5	Physics	5	Physics	5
	ESS 101	5	VLPA/I&S	5	Ocean 220	3/5
	VLPA/I&S	2				
		<b>15</b>		<b>15</b>		<b>13/15</b>
<b>3rd Year</b>	Ocean 410	4	Ocean 400	4	Ocean 401	3
	Ocean 430	4	Ocean 420	4	U/D Science	5
	U/D Science	5	VLPS/I&S	7	VLPS/I&S	7
	VLPS/I&S	2				
		<b>15</b>		<b>15</b>		<b>15</b>
<b>4th Year</b>	Ocean 442	3	Ocean 443	3	Ocean 444	5
	U/D Science	5	U/D Science	5	Electives	10
	VLPA/I&S	7	VLPA/I&S	6		
		<b>15</b>		<b>14</b>		<b>15</b>

\*Choose one of the sequences listed in the Basic Science Core Courses.



# COLLEGE HONORS PROGRAM

The College of Ocean and Fishery Sciences Honors Program offers outstanding students a course of study designed to provide intellectual challenges in a stimulating learning atmosphere drawing on the resources of a large, diversified University. Oceanography undergraduates in the top 15% of their year class may apply for Honors status.

COFS students have two options for pursuing Honors at the University of Washington:

**University Honors** – a four-year program combining an Honors core with combined with the departmental requirements for the degree. This program is best for entering freshmen. Interested students should apply at the time they submit their UW admissions application. Students completing these requirements become candidates for the degree “With College Honors.”

**COFS College Honors** – a two-year program consisting of departmental requirements, best for transfers and students applying after their sophomore year. Students interested in this program should speak with their departmental adviser. Students completing these requirements become candidates for the degree “With Distinction.”

## COFS Honors Natural Science Sequence in Marine Biology

All University Honors students need to do at least one Natural Science 3-quarter sequence. The College of Ocean and Fishery Sciences offers a sequence in Marine Biology, highly recommended, which is open to all UW and COFS Honors students.

The sequence consists of the following courses:

**Fish/Ocean/Biol 250(5)** Marine Biology  
**Ocean 220(5)** Field Investigations in Marine Biology  
Elective (4-5)

More information about these courses and Marine Biology on the University of Washington campus may be found at: <http://depts.washington.edu/marbio/>

Questions?

If at any time you have questions about either of these programs, would like to apply, or would like to declare Oceanography or Aquatic and Fishery Sciences as your major, you may contact one of the following advisers:

Oceanography Student Services Coordinator  
Michelle Townsend [mtown@u.washington.edu](mailto:mtown@u.washington.edu) 206-543-5039

For questions about the four-year University Honors Program, contact:  
**UW University Honors** [uw honors@u.washington.edu](mailto:uw honors@u.washington.edu) 206-543-7444  
<http://depts.washington.edu/uwhonors/index.html>

**For more information and specific degree requirements for the COFS Honors options, please review:**

<http://www.cofs.washington.edu/people/honors.html>

*"Lost City is truly one of the most remarkable places on our planet. Its serendipitous discovery shows that there is still much left to be learned about our oceans and the life they sustain," -- Dr. Deb Kelley, Associate Professor in the School.*

*The image at right is of the 200-foot tall carbonate chimney named Poseidon. The white chimney vents fluids at temperatures of 131 degrees Fahrenheit. Kelly and her colleagues discovered the field of hydrothermal chimneys in 2000. Unlike "black smoker" chimney vents, the fluid venting at Lost City is not driven by heat from cooling volcanoes, but from heat when seawater reacts with rocks below the field.*



# MINOR IN OCEANOGRAPHY

Enrollment in the Oceanography minor is open to all UW students. It is designed for students pursuing science degrees to tailor their studies to the marine environment.

The minor was created to provide students with the educational essentials to compete for career positions or to pursue graduate studies in the marine sciences. Careers are predominantly in research, both pure and applied, in research institutions, government agencies, consulting firms, and companies extracting and harvesting resources from the ocean. The minor could also serve as a background for a career in teaching, administration, marine affairs, environmental studies, production, inspection, instrumentation development, and statistical analysis.

## MINOR IN OCEANOGRAPHY REQUIREMENTS (25 Credits)

### 1) OCEAN 200, 210 and 220 (9 credits)

**OCEAN 200 INTRODUCTION TO OCEANOGRAPHY (3) Sp** Emphasis on the relationships and interactions of biology, chemistry, geology and physics in marine environments at macro-, meso- and microscales. Introduces basic oceanographic information, techniques and methods in an integrated fashion to science majors.

**OCEAN 210 OCEAN CIRCULATION (3) A** Large-scale circulation of the ocean. Topics include temperature-salinity analysis; water mass identification; water, salt and heat budgets; chemical tracer distributions; advection and diffusion. Prerequisite: either Ocean 101, Ocean 200, or OCEAN 250/BIOL 250/FISH 250; recommended: either PHYS 114 or PHYS 121.

**OCEAN 220 INTRODUCTION TO FIELD OCEANOGRAPHY (3) Sp** Methods of oceanographic field study. Instruments and sampling techniques. Writing assignment to teach report-writing skills. Prerequisite: either OCEAN 101 or OCEAN 200; recommended: OCEAN 210.

### 2) ONE OF THE FOLLOWING (4 credits):

**OCEAN 400 CHEMICAL OCEANOGRAPHY (4) W** Physical and chemical properties of seawater and marine products; processes determining chemical makeup of oceans. Stable isotopes and geochemistry of marine sediments and biogeochemistry. Prerequisites: OCEAN 210, CHEM 152.

**OCEAN 410 MARINE GEOLOGY & GEOPHYSICS (4) A** Overview of sedimentological and petrologic processes that determine the geologic record. Prerequisites: either ESS 101 or 210.

**OCEAN 420 PHYSICAL PROCESSES IN THE OCEAN (4) W** Physical properties and processes; theories and methods describing ocean currents, waves and tides. Prerequisites: OCEAN 210; either MATH 126 or QSCI 381; either PHYS 116 or PHYS 123.

**OCEAN 430 BIOLOGICAL OCEANOGRAPHY (4) A** Marine organisms, their quantitative distribution in time and space and their interactions with the ocean. Prerequisite: either BIOL 162 or BIOL 200; OCEAN 210; recommended BIOL 220.

**3) OCEAN 442 (3 credits) OCEANOGRAPHY OF THE PUGET SOUND (3) A** Learn about Puget Sound and explore the role of oceanography in regional issues. This course includes field opportunities and active investigation of oceanographic problems. Mixture of lectures, films, field trips, guest speakers, and student discussion. Open to all science majors with junior standing, no oceanography experience necessary.

### 4) OCEAN 300-400 Electives (9 credits)

## ADDITIONAL INFORMATION

Your major adviser or the University Advising Center staff are available to answer questions about a minor, or you may consult Oceanography's adviser Michelle Townsend, 108 Oceanography Teaching Building, 543-5039, [mtown@ocean.washington.edu](mailto:mtown@ocean.washington.edu). Students should also consult with their major advisers to determine which, if any, Oceanography courses would serve as science electives toward their major degree.



*The Oceanic Remote Chemical-optical Analyzer (ORCA) buoy, an autonomous water quality monitoring system located in Puget Sound, relays oceanic information to the School daily. Instruments such as ORCA are used for research as well as a learning tool for undergraduate and graduate students. ORCA supplies high-resolution time series data for student study and experimental design.*





## MINOR IN MARINE BIOLOGY

**A NOTE ABOUT MARINE BIOLOGY** At the UW, marine biology is a broad and exciting area of study covered by a collection of programs found throughout the main campus and field stations. Rather than major in marine biology, students choose a primary major in one of these programs and then can focus on marine courses and topics by taking advantage of courses offered by a variety of departments.

Interested in studying how waves, tides, sunlight, and global warming affect marine organisms? Consider a major in biological oceanography with a minor in marine biology.

Beginning during the 2008-2009 academic year, three units within UW - the School of Oceanography, the School of Aquatic and Fishery Sciences, and the Department of Biology - are joining together to offer a minor in marine biology. Details can be found on the UW's marine biology web page (<http://depts.washington.edu/marbio>). As with all UW minors, the marine biology minor can be obtained by any student who completes the required course work.

### PROPOSED STRUCTURE OF THE MINOR:

35 credits of study emphasizing marine biological concepts and integration of marine biology with traditional core ocean disciplines (Biology, Fisheries, Oceanography). Four required courses (18 credits) with electives comprising the remaining materials. Of the electives, students must take one course from each department.

REQUIRED COURSES	NAME	OFFERED	CREDITS
BIOL/FISH /OCEAN 250	Introduction to Marine Biology	Autumn	5 *
OCEAN 210	Ocean Circulation	Autumn	3
BIOL 180	Introduction to Biology	Autumn, Winter, Spring, Summer	5
Q SCI 381	Introduction to Probability & Statistics	Autumn, Winter, Spring	5 **

\* available to non-minors for 3 credits w/o lab section

\*\* prereq of MATH 120, a minimum score of 2 on advanced placement test, or a minimum score of 67% on MATHPC placement test

The list of elective courses is designed to be expansive and allow majors to select courses that will provide in depth content in marine biology while also meeting requirements within their selected major.

### Oceanography Courses

SUGGESTED COURSES	NAME	OFFERED	CREDITS
OCEAN 200	Introduction to Oceanography	Spring	3
OCEAN 220	Field Investigations in Oceanography	Spring	3/5
OCEAN 430	Biological Oceanography	Autumn	4
OCEAN 431	Advanced Biological Oceanography	Spring	3
OCEAN 442	Oceanography of Puget Sound	Autumn	3
OCEAN 454	Hydrothermal Vents	Spring	3

### SAFS Courses

SUGGESTED COURSES	NAME	OFFERED	CREDITS
FISH 310	Biology of Shellfish	Spring	5
FISH /BIOL 311	Biology of Fishes	Winter	3/5
FISH 312	Fisheries Ecology	Spring	3/5
FISH 323	Conservation and Management	Autumn	5
FISH 324	Aquatic Physiology	Winter	5
FISH 330	Climate Change Impacts on Marine Ecosystems	Winter	5
FISH 420	Ecology of Marine Fishes	Spring	4
FISH 475	Marine Mammology	Spring	5

### Biology Courses

SUGGESTED COURSES	NAME	OFFERED	CREDITS
BIOL/FISH 311	Biology of Fishes	Winter	3/5
BIOL 330	Natural History of Marine Invertebrates	Summer	5
BIOL 430	Marine Zoology	FHL	8
BIOL 432	Marine Invertebrates	FHL	9
BIOL 433	Marine Ecology	Spring	5
BIOL 434	Marine Invertebrate Zoology	Every other year	5
BIOL 445	Marine Botany	FHL	8
BIOL 446	Biology of Algae	Spring	5
BIOL 448	Marine Algal Ecology	Winter	3
BIOL/ FISH 478	Topics in Sustainable Fisheries	Winter	3

In addition to the natural science courses, students will be made aware of social science and policy courses that they might wish to take to fulfill VLPA or I&S requirements of all UW students (20 credits each).

SUGGESTED COURSES	NAME	OFFERED	CREDITS
OCEAN 102	The Changing Oceans	Winter	5
OCEAN 260	The Puget Sound Ecosystem	Autumn	3/5
SMA/ENVR/SIS 103	Society and the Oceans		5
SOC/ESRM/ENVR 379	Environmental Sociology		5
ECON 435*	Natural Resource Economics	Spring	5
SMA/ENVR 476	Introduction to Environmental Law and Process		3
SMA/ENVR/FISH 480	Marine Resource Conservation and Management	Winter	3
SMA 485	Pacific Recreation and Tourism Issues		3

\* ECON 300 is a prerequisite

## CONTACT INFORMATION

**IF YOU WOULD LIKE ADDITIONAL INFORMATION ON THE SCHOOL OF OCEANOGRAPHY AND ADVISING, PLEASE CALL OR VISIT:**

**Michelle Townsend, Student Services**  
**108 Oceanography Teaching Building**  
**University of Washington**  
**School of Oceanography**  
**Box 357940**  
**Seattle, Washington 98195-7940**

**Phone: (206) 543-5039**

**FAX: (206) 543-6073**

**E-mail: [mtown@ocean.washington.edu](mailto:mtown@ocean.washington.edu)**

**-or-**

**[student@ocean.washington.edu](mailto:student@ocean.washington.edu)**

**SCHOOL OF OCEANOGRAPHY HOME PAGE:**

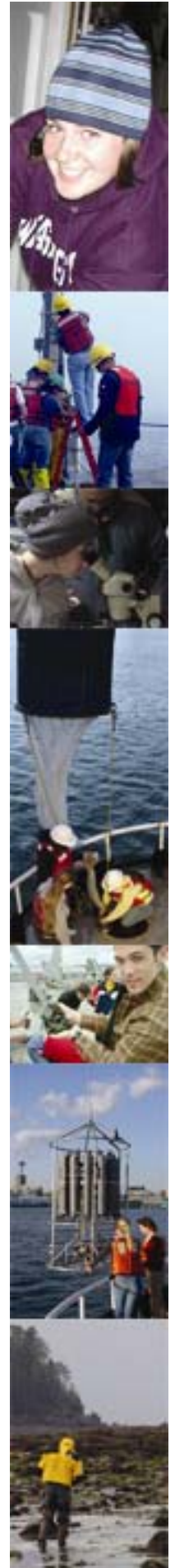
**<http://www.ocean.washington.edu>**

**UNIVERSITY OF WASHINGTON HOME PAGE:**

**<http://www.washington.edu>**

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The University of Washington is committed to providing access, equal opportunity and reasonable accommodation in its services, programs, activities, education and employment for individuals with disabilities. To request disability accommodation in the application process contact the department at (206) 543-5039 or the Disability Services Office at least ten days in advance at: (206) 543-6450/V, (206) 543-6452/TTY, (206) 685-3885 (FAX), or [access@u.washington.edu](mailto:access@u.washington.edu). For classroom and academic-related accommodation, contact Disabled Student Services at (206) 543-8924/V, (206) 543-8925/TTY, (206) 616-8379 (FAX), or [uwdss@u.washington.edu](mailto:uwdss@u.washington.edu).





**School of Oceanography**  
University of Washington

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