

B.S. Marine Science, with optional Marine Biology, Marine Physical Sciences, or Aquaculture Concentrations

Student Name:

- To earn a Bachelor of Science degree in Marine Science students must complete 1) the CORE requirements for the major, 2) at least 15 credits of approved Marine Science Electives at 300+ level, 3) UM General Education requirements, and 4) a total of at least 120 credit hours.
- In order to graduate, students entering in Fall 2008 and later must have a C- or better in courses required for the major in Marine Science, i.e., in CORE courses listed below, SMS Electives, and any additional courses required for the concentrations.
- Students may choose to declare a concentration.
The requirements for these concentrations are listed separately, but can affect choices in the CORE requirements.

Course #	Course Title	Credits	Sem.	Grade
CORE requirements for all marine science majors				
<u>Biology, Chemistry & Policy</u>				
BIO 100	Basic Biology	4		
BMB 280	Introduction to Molecular and Cellular Biology	3		
CHY 121	Introduction to Chemistry	3		
CHY 123	Introduction to Chemistry Laboratory	1		
CHY 122	The Molecular Basis of Chemical Change	3		
CHY 124	The Molecular Basis of Chemical Change Laboratory	1		
SMS 230	Marine Policy	3		
NFA 117	Issues and Opportunities	1		PF
<u>Math</u>				
STS 232	Principles of Statistical Inference	3		
MAT 126	Calculus I	4		
<u>Physics (choose 1 pair):</u>				
{ PHY 111	General Physics I	4		
{ PHY 112	General Physics II	4		
{ PHY 121	Physics for Engineers & Physical Scientists I	4		
{ PHY 122	Physics for Engineers & Phy Sci II	4		
<u>Earth Science (choose 1)</u>				
ERS 101	Introduction to Geology	4		
ERS 102	Environmental Geology of Maine	4		
ERS 109	Geology of Maine	3		
SMS 108	Beaches and coasts	3		
<u>Marine Science Core</u>				
SMS 100	Introduction to Ocean Science	3		
SMS 201	Biology of Marine Organisms	3		
SMS 302	Oceanography	3		
SMS 402	Oceans and Climate Change	3		
<u>Four Integrative Marine Science Courses</u>				
SMS 203	Introduction to Integrative Marine Science	1		
SMS 204	IMS II: Chemistry & Physics	2		
SMS 303	IMS III: Oceanography	2		
SMS 304	IMS IV: Comp Phys, Cell. & Mol. Bio.	2		
<u>Senior Capstone experience (4 credits total)</u>				
SMS 400	Capstone Experience in Marine Science	3		
SMS 404	Senior Capstone Seminar	1		
		total 61-62		

MARINE SCIENCE ELECTIVES: B.S. in Marine Science without concentration

All students must complete an additional 15 credits in SMS courses and appropriate

INT courses at **300 level or higher**. Please consult the course list below.

- Students may choose to declare a concentration --

the requirements for those concentrations follow separately, and will determine the choice of these 15 credits.

MARINE SCIENCE ELECTIVES LIST: 15 credits required.

- To be well-prepared for further study or employment, we strongly recommend students include courses that cover primary producers, vertebrate and invertebrate organisms, and marine ecology. Students are also encouraged to take Semester by the Sea courses at the Darling Marine Center in the Autumn of their junior or senior year.
- The optional Marine Biology and Physical Marine Science Concentrations require choosing from a specific group of electives, as well as additional courses. See the appropriate checksheet for those requirements.

		credits	Sem	Grade
SMS 300	Marine Ecology	3		
SMS 306	Field Marine Ecology	4		
INT 308	Conservation & Ecology of Marine Mammals	3		
SMS 321	Introduction to Fisheries Science	3		
SMS 322	Biology of Marine Vertebrates	3		
SMS 325	Marine Geology	3		
SMS 330	Descriptive Physical Oceanography	3		
SMS 333	Applied Meteorology	3		
SMS 354	Thinking About the Oceans	3		
SMS 373	Marine and Freshwater Algae	4		
SMS 410	Marine Physics	4		
SMS 422	Biology of Fishes	3		
SMS 425	Applied Population Genetics	3		
SMS 450	Field Experience in Marine Sciences	1 to 4		
SMS 460	Climate Change: Understanding the Forecast	3		
SMS 475	Field Marine Ecology	4		
SMS 350	SBS: Undergraduate Seminar	1		
SMS 352	SBS: Marine Ecology	4		
SMS 480	SBS: Biology of Marine Invertebrates	4		
SMS 481	SBS: Design of Marine Organisms	4		
SMS 482	SBS: Human Impacts on the Ocean	3		
SMS 490	SBS: Special Topics	1 to 4		
INT 441	SBS: Maritime History & Archaeology of New England	3		
INT 484	SBS: Intro. Systems Modeling for Bio Sciences	2		
SMS 485	Compar. Animal Physiology	3+1		
INT 475	Field Studies in Ecology	Arr.		
SMS 491	Problems in Marine Sciences	Arr.		
SMS 497	Independent Study in Marine Science	1 to 4		

REQUIRED GENERAL EDUCATION COURSES:

Human Values and Social Context (18 credits minimum)

18 credits required, including at least 3 credits from each sub-category. A 3-credit course that satisfies two sub-categories will constitute completion of both; however, the credits may only be counted once.

Western Cultural Tradition (INT 441 fits here)

Credits Sem. Grade

Social Contexts and Institutions

Cultural Diversity and International Perspectives

Population and the Environment

(SMS 100, SMS 108, SMS 230 and SMS 482 fit here)

Artistic and Creative Expression

Ethics (3 credits minimum): this requirement is separate from HVSC above, but students can choose a course that meets both the Ethics and a Human Values & Social context requirement and count the credits towards both.

Demonstrated Writing Competency

(ENG 101 and two additional writing intensive courses, one must be in the major)

ENG 101 College Composition 3

SMS 404 Capstone Seminar 0

(credits counted on page 1)

SMS 400 Capstone Experience in Marine Sciences 0

(credits counted on page 1)

other: _____

FREE ELECTIVES

Credits Sem. Grade

OPTIONAL MARINE BIOLOGY CONCENTRATION

Students may choose to declare a concentration in Marine Biology. The concentration requires

• **15 credit hours in SMS electives selected from the SMS Marine Biology Elective list below**

• **6 additional credit hours chosen from the SMS Marine Biology Electives or**

Additional Biology Electives list

• **One lab and lecture course in Organic Chemistry**

The Concentration adds approximately 10 credit hours to the basic requirements for the Marine Science degree.

To be well-prepared for further study or employment, we strongly recommend students include courses that cover primary producers, vertebrate and invertebrate organisms, marine ecology, evolution or genetics.

Students are also encouraged to take Semester by the Sea courses at the Darling Center in the Autumn of their junior or senior year.

SMS Marine Biology Electives list : Choose a minimum of 15 credit hrs			Credits	Sem.	Grade
INT	308	Conservation & Ecology of Marine Mammals	3		
INT	441	SBS: Maritime History and Archaeology	3		
INT	484	SBS: Introduction to Systems Modeling for Bio.Sci.	2		
SMS	300	Marine Ecology	3		
SMS	306	Field Marine Ecology	4		
SMS	321	Introduction to Fisheries Science	3		
SMS	322	Biology of Marine Vertebrates	3		
SMS	350	SBS: Undergraduate Seminar	1		
SMS	352	SBS: Marine Ecology	4		
SMS	354	Thinking About the Oceans	3		
SMS	373	Marine and Freshwater Algae	4		
SMS	422	Biology of Fishes	3		
SMS	425	Applied Population Genetics	3		
SMS	480	SBS: Biology of Marine Invertebrates	4		
SMS	481	SBS: Design of Marine Organisms	4		
SMS	482	SBS: Human Impacts on the Ocean	3		
SMS	485	Comparative Animal Physiology AND	3		
SMS	490	SBS: Special Topics (appropriate topics)	1 to 3		
SMS	491	Problems in Marine Sciences (appropriate topics)	Arr.		
SMS	497	Independent Study in Marine Science (must be approved)	1 to 4		
					total 15 to 21
ADDITIONAL BIOLOGY ELECTIVES LIST					
BIO	336	Developmental Biology	4		
BIO	353	Invertebrate Zoology	4		
BIO	354	Biology of Behavior	3		
BIO	445	Plant Genetics	3		
{	BIO	452	Plant Physiology AND	3	
	BIO	453	Plant Physiology Laboratory	1	
BIO	462	Principles of Genetics	3		
BIO	465	Evolution	3		
{	BMB	300	General Microbiology AND	3	
	BMB	305	General Microbiology Laboratory	2	
{	BMB	322	Biochemistry AND	3	
	BMB	323	Biochemistry Lab	1	
{	BMB	430	Bacterial Physiology AND	3	
	BMB	431	Bacterial Physiology Laboratory	1	
BMB	490	Microbial Genetics	4		
					total up to 6
Organic Chemistry (choose one lecture and lab pair)					
{	BMB	221	Organic Chemistry AND	3	
	BMB	222	Laboratory in Organic Chemistry OR	1	
{	CHY	251	Organic Chemistry I AND	3	
	CHY	253	Organic Chemistry Laboratory I	2	
					total 4-5

OPTIONAL MARINE PHYSICAL SCIENCES CONCENTRATION

Students may choose to declare a concentration in Marine Physical Science. The concentration requires:

- **Physics 121 and 122 (chosen in the Marine Science CORE courses)**
- **ERS 101 or ERS 102 or ERS 109 (chosen in the Marine Science CORE courses)**
- **MAT 127 (Calculus II)**
- **9 credit hours in SMS electives selected from the SMS Marine Physical Science Elective list below**
- **12 additional credit hours chosen from the SMS Marine Physical Science Electives OR**

Additional Physical Science Electives list

The Concentration adds approximately 10 credit hours to the basic requirements for the Marine Science degree.

Students are encouraged to take Semester by the Sea courses at the Darling Center in the Autumn of their junior or senior year.

SMS Marine Physical Science Electives: choose a minimum of 9 credits

	Credits	Sem.	Grade
SMS 354 Thinking about the Ocean	3	_____	_____
SMS 321 Intro to Fisheries Science	3	_____	_____
SMS 330 Descriptive Physical Oceanography	3	_____	_____
SMS 350 SBS: Undergraduate Seminar	1	_____	_____
SMS 481 SBS: Design of Marine Organisms	4	_____	_____
SMS 482 SBS: Human Impacts on the Ocean	3	_____	_____
SMS 490 SBS: Special Topics (Appropriate topics)	1 to 4	_____	_____
SMS 491 Problems in Marine Sciences (Appropriate topics)	Arr.	_____	_____
Appropriate SMS 500 level courses (with instructors permission)	3	_____	_____
Additional Physical Science Electives			
CHY 242 Principles of Quantitative Analysis and Solution Equilibria	5	_____	_____
CHY 251 Organic Chemistry I (AND Lab, CHY 253)	5	_____	_____
CHY 252 Organic Chemistry II (AND lab, CHY 254)	5	_____	_____
CHY 371 Physical Chemistry I	3	_____	_____
CHY 372 Physical Chemistry II	3	_____	_____
ERS 200 Earth Systems	4	_____	_____
ERS 201 Global Environmental Change	4	_____	_____
ERS 312 Geochemistry	3	_____	_____
ERS 314 Invertebrate Paleontology	3	_____	_____
ERS 315 Principles of Sedimentology & Stratigraphy	4	_____	_____
ERS 316 Structural Geology	4	_____	_____
ERS 317 Intro to Geophysics	3	_____	_____
ERS 330 Minerology	4	_____	_____
ERS 408 Coastal processes and coastal zone management	3	_____	_____
ERS 420 Computer Applications in Earth Sci	3	_____	_____
ERS 460 Marine Geology	3	_____	_____
ERS 323 Severe & Hazardous Weather	3	_____	_____
ERS 350 Fresh-water flow	3	_____	_____
MAT 228 Calculus III	4	_____	_____
MAT 258 Intro. To Diff Eqns with Linear Algebra	4	_____	_____
MAT 262 Linear Algebra	3	_____	_____
MAT 434 Intro to Statistics	3	_____	_____
MAT 453 Partial Differential Equations	3	_____	_____
PHY 238 Mechanics	3	_____	_____
COS 125 Intro to problem solving using programming	3	_____	_____
COS 225 Intro to Object-Oriented Programming and Design	3	_____	_____
COS 226 Intro to Data Structures	3	_____	_____
COS 211 Principles of Data Processing	3	_____	_____
MEE 150 Applied Mechanics: Statics	3	_____	_____
MEE 230 Thermodynamics	3	_____	_____
MEE 360 Fluid Mechanics	3	_____	_____
CIE 350 Hydraulics	3	_____	_____

Other courses are possible with permission of Undergrad. Coordinator

OPTIONAL MARINE AQUACULTURE CONCENTRATION

Students may choose to declare a concentration in Aquaculture Science. The concentration requires:

		credits	Sem	Grade
SMS 211	Introduction to Aquaculture	3	_____	_____
SMS 401	Critical Issues in Aquaculture	1	_____	_____
SMS 422	Biology of Fishes	3	_____	_____
SMS 425	Applied Population Genetics	3	_____	_____
SMS 449	Engineering in Aquaculture	4	_____	_____
SMS 467	Fish Nutrition and Feeding	3	_____	_____
INT 110	Modern Economic Problems	3	_____	_____
Choose one pair				
SMS 309	Techniques in Shellfish Aquaculture	2	_____	_____
SMS 409	Shellfish Aquaculture	3	_____	_____
or				
SMS 420	Fish Aquaculture I	3	_____	_____
SMS 421	Fish Aquaculture II	3	_____	_____

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