

Curriculum Standard for Natural Resource Systems: Marine Technology

Career Cluster: Agriculture, Food, and Natural Resources **

Cluster Description: The production, processing, marketing, distribution, financing, and development of agricultural commodities and resources including food, fuel, fiber, wood products, natural resources, horticulture, and other plant and animal products/resources.

Pathway: Natural Resource Systems

Effective Term: Fall 2015 (2015*03)

Program Majors Under Pathway

Program Major / Classification of Instruction Programs (CIP) Code	Credential Level(s) Offered	Program Major Code
Marine Science	CIP Code 26.1302	AAS/Diploma/Certificate A15310
Marine Technology	CIP Code: 03.0301	AAS/Diploma/Certificate A15320

Pathway Description:

These curricula prepare individuals for a variety of marine-related occupations such as marine conservation, water analysis, marine scientific research support and commercial fishing. Individuals will be prepared as naturalists within the ecotourism industry and be trained in observational and measurement techniques aboard a variety of vessels including ocean-going research vessels.

Course work includes a unique blend of traditional and contemporary vocational, technical, and scientific marine education. Course work specific for Marine Sciences includes instruction in biological sciences, environmental sciences, and marine sciences. Field and laboratory experiences prepare students to identify, observe, and collect scientific data associated with the fauna and flora found in the rivers, estuaries, sounds, and ocean. Course work in Marine Technologies includes instruction in the use of physical, chemical, meteorological, biological, and geological oceanographic instrumentation and sampling equipment.

Graduates are prepared for employment opportunities with aquariums, fisheries, corps of engineers, marine patrol, ecotourism companies, commercial fishing industries, entry-level field or laboratory positions with industries, state and federal agencies, and educational facilities associated with marine science and research. Career opportunities include oceanography, environmental science, marine biology, geophysical exploration, and fisheries-related employment.

Program Major Description: Choose one of the following 4th paragraphs to use in conjunction with the first three paragraphs of the pathway description above for documentation used to identify each Program Major:

Marine Science: A program that focuses on the scientific study of the ecology and behavior of microbes, plants, and animals inhabiting oceans, coastal waters, and saltwater wetlands and their interactions with the physical environment. Potential course work includes instruction in chemical, physical, and geological oceanography; molecular, cellular, and biochemical studies; marine microbiology; marine botany; ichthyology; mammalogy; marine population dynamics and biodiversity; reproductive biology; studies of specific species, phyla, habitats, and ecosystems; marine paleocology and palentology; and applications to fields such as fisheries science and biotechnology.

Marine Technology: A program that provides the practical and academic skills essential for success in marine scientific support. Training in the operation and maintenance of seismic and hydrographic instrumentation including: side scan sonar, multibeam echo sounders, and sub-bottom profilers is provided in the classroom and underway at sea. Additional course work includes: classic and digital navigation techniques, practical applications of boat handling, seamanship, marlinspike seamanship, and safety at sea. Instruction applicable to fisheries science and environmental assessment is provided.

**Within the degree program, the institution shall include opportunities for the achievement of competence in reading, writing, oral communication, fundamental mathematical skills, and basic use of computers.*

Approved by the State Board of Community Colleges on August 16, 2012; Editorial Revision 12/14/12; Editorial Revision 08/21/13; CRC Revised—Electronic Only 05/29/14; Editorial Revision 07/01/14; Editorial Revision 02/24/15; SBCC Revised 03/20/15; Prefix Addition 08/01/15; SBCC Revised 03/17/17; CCRC Revised—Electronic Only (RISE Initiative) 10/24/19; Prefix addition 11/07/19.

I. General Education Academic Core

[Curriculum Requirements for associate degree, diploma, and certificate programs in accordance with 1D SBCCC 400.10]: Degree programs must contain a minimum of 15 semester hours including at least one course from each of the following areas: humanities/fine arts, social/behavioral sciences, and natural sciences/mathematics. Degree programs must contain a minimum of 6 semester hours of communications. Diploma programs must contain a minimum of 6 semester hours of general education; 3 semester hours must be in communications. General education is optional in certificate programs.

Natural Resource Systems: Marine Technology

Recommended General Education Academic Core	AAS	Diploma	Certificate
Minimum General Education Hours Required:	15 SHC	6 SHC	0 SHC
<p><i>Courses listed below are recommended general education courses for this curriculum standard. Colleges may choose to include additional or alternative general education courses to meet local curriculum needs.</i></p> <p><i>*Recommended certificate and diploma level curriculum courses. These courses may <u>not</u> be included in associate degree programs.</i></p>			
<p>Communication:</p> <ul style="list-style-type: none"> *COM 101 Workplace Communication 3 SHC COM 110 Introduction to Communication 3 SHC COM 120 Intro Interpersonal Com 3 SHC COM 231 Public Speaking 3 SHC *ENG 101 Applied Communications I 3 SHC *ENG 102 Applied Communications II 3 SHC ENG 110 Freshman Composition 3 SHC ENG 111 Expository Writing 3 SHC ENG 112 Argument-Based Research 3 SHC ENG 114 Prof Research & Reporting 3 SHC ENG 115 Oral Communication 3 SHC ENG 116 Technical Report Writing 3 SHC 	6 SHC	3-6 SHC	Optional
<p>Humanities/Fine Arts:</p> <ul style="list-style-type: none"> *HUM 101 Values in the Workplace 2 SHC HUM 110 Technology and Society 3 SHC HUM 115 Critical Thinking 3 SHC HUM 230 Leadership Development 3 SHC PHI 230 Introduction to Logic 3 SHC PHI 240 Introduction to Ethics 3 SHC 	3 SHC	0-3 SHC	Optional
<p>Social /Behavioral Sciences:</p> <ul style="list-style-type: none"> ECO 151 Survey of Economics 3 SHC ECO 251 Prin of Microeconomics 3 SHC GEO 110 Introduction to Geography 3 SHC GEO 111 World Regional Geography 3 SHC *PSY 101 Applied Psychology 3 SHC *PSY 102 Human Relations 2 SHC PSY 118 Interpersonal Psychology 3 SHC PSY 135 Group Processes 3 SHC PSY 150 General Psychology 3 SHC *SOC 105 Social Relationships 3 SHC SOC 210 Introduction to Sociology 3 SHC SOC 215 Group Processes 3 SHC 	3 SHC	0-3 SHC	Optional
<p>Natural Sciences/Mathematics:</p> <ul style="list-style-type: none"> BIO 140 Environmental Biology 3 SHC BIO 160 Introductory Life Science 3 SHC MAT 110 Math Measurement & Literacy 3 SHC MAT 121 Algebra/Trigonometry I 3 SHC MAT 143 Quantitative Literacy 3 SHC MAT 152 Statistical Methods I 4 SHC MAT 171 Precalculus Algebra 4 SHC PHY 110 Conceptual Physics 3 SHC PHY 121 Applied Physics I 4 SHC 	3 SHC	0-3 SHC	Optional

II. Major Hours. AAS, diploma, and certificate programs must include courses which offer specific job knowledge and skills. Work-based learning may be included in associate in applied science degrees up to a maximum of 8 semester hours of credit; in diploma programs up to a maximum of 4 semester hours of credit; and in certificate programs up to a maximum of 2 semester hours of credit. Below is a description of each section under Major Hours.

- A. Technical Core.** The technical core is comprised of specific courses which are required for all Program Majors under this Curriculum Standard. A diploma program offered under an approved AAS program standard or a certificate which is the highest credential level awarded under an approved AAS program standard must include a minimum of 12 semester hours credit derived from the curriculum core courses or core subject area of the AAS program.
- B. Program Major(s).** The Program Major must include a minimum of 12 semester hours credit from required subjects and/or courses. The Program Major is in addition to the technical core.
- C. Other Major Hours.** Other major hours must be selected from prefixes listed on the curriculum standard. A maximum of 9 semester hours of credit may be selected from each prefix listed, with the exception of prefixes listed in the core.

Natural Resource Systems: Marine	AAS	Diploma	Certificate
Minimum Major Hours Required:	49 SHC	30 SHC	12 SHC
<p>A. Technical Core:</p> <ul style="list-style-type: none"> *MSC 122 Boat Handling/Seamanship 3 SHC *MSC 124 Industrial Skills 3 SHC *MSC 132 Fishing Gear Tech I 3 SHC *MSC 150 Marine Navigation 3 SHC *MSC 160 Oceanography 4 SHC MSC 180 Water Analysis 3 SHC MSC 276 Marine Vertebrate Zoo 4 SHC <p>B. Program Major(s): Marine Science <i>Select a minimum of 12 SHC from the following courses for the Marine Science AAS program:</i></p> <ul style="list-style-type: none"> BIO 111 General Biology I 4 SHC BIO 146 Regional Natural History 4 SHC BIO 243 Marine Biology 4 SHC <p>Ecology. Select 4-7 SHC:</p> <ul style="list-style-type: none"> BIO 145 Ecology 4 SHC <i>or</i> ENV 110 Environmental Science 3 SHC <i>and</i> ENV 220 Applied Ecology 4 SHC <p><i>Select a minimum of 12 SHC from technical core or program major courses for a diploma in Marine Science.</i></p> <p>Marine Technology <i>Select a minimum of 12 SHC from the following courses for the Marine Technology AAS program:</i></p> <ul style="list-style-type: none"> *MSC 110 Training Cruise I 1 SHC *MSC 112 Training Cruise II 1 SHC *MSC 114 Training Cruise III 1 SHC *MSC 126 Marine Engines 2 SHC *MSC 134 Fishing Gear Technology II 2 SHC *MSC 152 Marine Instrumentation 2 SHC *MSC 172 Marine Biology 3 SHC *MSC 174 Marine Invertebrate Zoo 4 SHC <p><i>Courses required for the Marine Technology diploma are designated with *</i></p>	35 SHC	12- 32 SHC	
C. Other Major Hours.			

To be selected from the following prefixes:

AGR, AQU, BIO, BUS, CHM, CIS, CSC, DFT, ELN, ENV, ETR, FOR, FWL, GIS, HEA, HOR, MAT, MSC, NET, PED, PHO, PHY, REC, TRF, TXY, VEN, WBL, WLD, WPP and ZAS

Up to two semester hour credits may be selected from ACA.

Up to three semester hour credits may be selected from the following prefixes: ARA, ASL, CHI, FRE, GER, ITA, JPN, LAT, POR, RUS and SPA.

III. Other Required Hours

A college may include courses to meet graduation or local employer requirements in a certificate (0-1 SHC), diploma (0-4 SHC), or an associate in applied science (0-7 SHC) program. These curriculum courses shall be selected from the Combined Course Library and must be approved by the System Office prior to implementation. Restricted, unique, or free elective courses may not be included as other required hours.

IV. Employability Competencies

Fundamental competencies that address soft skills vital to employability, personal, and professional success are listed below. Colleges are encouraged to integrate these competencies into the curriculum by embedding appropriate student learning outcomes into one or more courses or through alternative methods.

- A. Interpersonal Skills and Teamwork** – The ability to work effectively with others, especially to analyze situations, establish priorities, and apply resources for solving problems or accomplishing tasks.
- B. Communication** – The ability to effectively exchange ideas and information with others through oral, written, or visual means.
- C. Integrity and Professionalism** – Workplace behaviors that relate to ethical standards, honesty, fairness, respect, responsibility, self-control, criticism and demeanor.
- D. Problem-solving** – The ability to identify problems and potential causes while developing and implementing practical action plans for solutions.
- E. Initiative and Dependability** – Workplace behaviors that relate to seeking out new responsibilities, establishing and meeting goals, completing tasks, following directions, complying with rules, and consistent reliability.
- F. Information processing** – The ability to acquire, evaluate, organize, manage, and interpret information.
- G. Adaptability and Lifelong Learning** – The ability to learn and apply new knowledge and skills and adapt to changing technologies, methods, processes, work environments, organizational structures and management practices.
- H. Entrepreneurship** – The knowledge and skills necessary to create opportunities and develop as an employee or self-employed business owner.

An **Employability Skills Resource Toolkit has been developed by NC-NET for the competencies listed above. Additional information is located at: <http://www.nc-net.info/employability.php>*

***The North Carolina Career Clusters Guide was developed by the North Carolina Department of Public Instruction and the North Carolina Community College system to link the academic and Career and Technical Education programs at the secondary and postsecondary levels to increase student achievement. Additional information about Career Clusters is located at: http://www.nc-net.info/NC_career_clusters_guide.php or <http://www.careertech.org>.*

Summary of Required Semester Hour Credits (SHC) for each credential:

	AAS	Diploma	Certificate
Minimum General Education Hours	15	6	0
Minimum Major Hours	49	30	12
Other Required Hours	0-7	0-4	0-1
Total Semester Hours Credit (SHC)	64-76	36-48	12-18