

UNIVERSITY OF TEXAS RIO GRANDE VALLEY
BS Marine Biology
Course Descriptions

A – GENERAL EDUCATION CORE – 42 HOURS

Students must fulfill the General Education Core requirements. The courses listed in this section satisfy both degree requirements and General Education core requirements.

MATH 1343 Introduction to Biostatistics

Topics include introduction to biostatistics; biological and health studies and designs; probability and statistical inferences; one- and two-sample inferences for means and proportions; one-way ANOVA and nonparametric procedures. *Prerequisites:* College Ready TSI status in Mathematics.

OR

MATH 1388 Honors

Topics include introduction to biostatistics; biological and health studies and designs; probability and statistical inferences; one- and two-sample inferences for means and proportions; one-way ANOVA and nonparametric procedures. *Prerequisites:* College Ready TSI status in mathematics and admission to the honors program

CHEM 1311 General Chemistry I

Fundamentals of atomic structure, electronic structure and periodic table, nomenclature, the stoichiometry reactions, gas laws, thermochemistry, chemical bonding, and structure and geometry of molecules. *Prerequisites:* MATH 1314, MATH 1414, MATH 1342, MATH 1343, MATH 1388, MATH 2412, MATH 2413, or MATH 2487 with a grade of "C" or higher."

CHEM 1312 General Chemistry II

This course presents the properties of liquids and solids, solutions-acid-base theory, chemical kinetics, equilibrium, chemical thermodynamics, electrochemistry, nuclear chemistry, and representative organic compounds. *Prerequisites:* CHEM 1311

PHIL 1366 Philosophy and History of Science and Technology

This course is designed to use history and philosophy in the service of science and engineering education. It does this by examining a selection of notable episodes in the history of science and Techno-Science. Episodes examined may include the mathematical sciences in Antiquity, Archimedes' inventions and principle of hydrostatics, Roman techno-science, Medieval medicine, alchemy, Kepler's laws of planetary motion, Galileo's conflict with the Catholic Church, Isaac Newton's formulation of the laws of motion, Dalton's atomic theory, Louis Pasteur's public trial of the anthrax vaccine, Charles Darwin's proposal of the theory of evolution by natural selection, the development of the atomic bomb, and the discovery of the double helix structure of DNA.

CHEM 1111 General Chemistry I Lab

An introduction to basic laboratory techniques using experiments to understand chemical concepts of reactions, stoichiometry and titrations. *Prerequisites:* Credit/registration in CHEM 1311.

CHEM 1112 General Chemistry II Lab

A continuation of CHEM 1111 using more advanced laboratory techniques such as volumetric, gravimetric and spectrophotometric methods of analysis and qualitative inorganic analysis to reinforce topics covered in CHEM 1312. *Prerequisites:* Credit/registration in CHEM 1312.

B – MAJOR REQUIREMENTS – 58 HOURS (47 ADVANCED)

1 – Marine Biology Core – 37 hours (26 advanced)

BIOL 1406 General Biology I [3-3]

A study of the basic principles of Biology. Topics will include biological chemistry, cell structure and function, photosynthesis and respiration, DNA structure and function, mitosis, meiosis, Mendelian genetics, evolution and the structure and function of bacteria, viruses, protozoan, algae, fungi and plants. *Credit Restriction:* Credit may be received in only one of BIOL 1406 or BIOL 1487.

OR

BIOL 1487 General Biology I Honors [3-3]

An accelerated study of the basic principles of Biology. Topics covered include cellular biology, photosynthesis, respiration, protein synthesis, cellular reproduction, genetics, microbial genetics and a survey of the diversity of organisms. Open to students enrolled in the Honors Studies Program or by permission of the instructor. *Credit Restriction:* Credit may be received in only one of BIOL 1406 or BIOL 1487.

BIOL 1407 General Biology II [3-3]

A continuation of Biology 1406. Topics include evolution and diversity of invertebrate and vertebrate animals; mechanisms of support and movement, digestion and nutrition, respiration, circulation homeostasis, hormonal control, nervous control, sexual reproduction, development, behavior and ecology. *Credit Restriction:* Credit may be received in only one of BIOL 1407 or BIOL 1488. *Prerequisite:* BIOL 1406.

OR

BIOL 1488 General Biology II Honors [3-3]

An accelerated study of the basic concepts of Biology. Topics covered include reproduction and development, digestion and nutrition, transport, homeostasis, the nervous system, ecology and evolution. Open to students enrolled in the Honors Studies Program or by permission of the instructor. *Credit Restriction:* Credit may be received in only one of BIOL 1407 or BIOL 1488.

MARS 2310 Marine Processes and Ecosystem Dynamics (or BIOL 2310) [3-0]

This course investigates the interactions between organisms and the physical processes that regulate productivity and distribution of marine life in oceanic and coastal ecosystems.

MARS 3320 Marine Biogeochemistry (or BIOL 3320) [3-0]

This course is a study of the biological, chemical, geological, and physical processes that influence cycling of bioactive elements in marine waters and sediments.

MARS 3430 Field Methods and Analysis in Marine Biology (or BIOL 3430) [3-3]
This course introduces the study of marine systems utilizing specialized field methods and provides students with a basic knowledge of coastal habitats and associated fauna and flora. Students will design experiment and collect and analyze data from field research projects as a group.

BIOL 3413 Genetics [3-3]
Introductory lectures and laboratories in classical genetics. Topics will include Mendelian genetics, cell mechanics, sex determination, sex linkage, DNA structure and function, genetic linkage, crossing over, gene mapping, mutation, regulation of gene expression, chromosomal variations, population genetics, and evolution. *Prerequisites:* BIOL 1406 (or BIOL 1487), BIOL 1407 (or BIOL 1487), CHEM 1311, CHEM 1111, CHEM 1312, and CHEM 1112.

BIOL 3415 Molecular Biology [3-3]
A study of the structure and function of biological macromolecules as they relate to the functioning of whole cells and organisms. Topics include the structure and function of nucleic acids and proteins, DNA replication and repair, transcription, translation, gene regulation, genetic engineering and gene regulation, genetic engineering, applications of molecular technologies and biotechnology, bacteriophages, and mobile genetic elements. *Prerequisites:* Either BIOL 3413 or BIOL 3401; and also CHEM 2323 CHEM 2123.

OR

BIOL 3412 Cell Biology [3-3]
A study of cell structure and function with emphasis on bio-energetics, membranes, genes, and genetic control, cell division and its regulation, and cellular differentiation. *Prerequisites:* BIOL 1406 (or BIOL 1487), BIOL 1407 (or BIOL 1487), CHEM 2123, and CHEM 2323.

BIOL 3301 Biological Evolution [3-0]
Genetic, ecological, and paleontological aspects of evolution. Includes review of evolutionary history and thought, species concepts, speciation, and other evolutionary processes. Emphasis is on evolutionary mechanisms. *Prerequisites:* BIOL 1406 (or BIOL 1487) and BIOL 1407 (or BIOL 1488), or permission of instructor.

BIOL 3409 Ecology [3-3]
A study of the basic environmental factors affecting plants and animals, and their relation to economic and conservation problems. Field work. *Prerequisites:* 9 hours of Biology, including BIOL 1407 (or BIOL 1488).

MARS 4401 Marine Biology Seminar (Capstone) (or BIOL 4401) [3-3]
The student completes an independent scholarly review of a marine biology research topic, makes an oral report on the topic, and debates current marine issues with faculty and students. (Cannot be used for credit with BIOL 4100.) *Prerequisites:* Senior standing and 24 hours of Biology.

2 – Marine Biology Electives – 17 hours (17 advanced)

BIOL 3414 Invertebrate Zoology [3-3]

Study of the comparative morphology, evolution, systematics and natural history of the invertebrates.

Recommended as a preparatory course for BIOL 4402, BIOL 4407, BIOL 4415 and BIOL 5316.

Prerequisites: 6 hours of biology and junior standing.

BIOL 4388 Global Change Ecology [3-3]

This course will cover different aspects of global change, emphasizing topics such as habitat alteration, species extinctions, spread of diseases, invasive species, global warming, and the impact of these factors on conservation efforts. *Prerequisites:* BIOL 3409 or consent of instructor.

BIOL 4403 Introduction to Remote Sensing Technology [3-3]

This course provides training in the use of electromagnetic radiation for monitoring environmental conditions and resources. Emphasis will be placed on the operation of various remote sensors, collection of analog and digital data, and use of computer software for image processing, interpretation, and integration of imagery into geographic information systems. *Prerequisites:* Consent of instructor.

BIOL 4404 Ichthyology [3-3]

A study of ecology, distribution, adaptations, physiology, systematics, and evolution of freshwater and marine fishes, with an emphasis on local forms. Laboratories will stress identification and other practical applications of modern ichthyological techniques. *Prerequisites:* 9 hours of Biology.

GEOL 3408 Introduction to Geographic Information Systems [3-3]

This course covers fundamental concepts and techniques of Geographic Information Systems (GIS).

Concepts include: the basics of maps including projections, datums, coordinate systems, map interpretation, design and field mapping techniques. Additional concepts include: GPS theory and application within a GIS framework as well as an introduction to ArcGIS software to include geospatial data acquisition, processing, and mapping.

MARS 4199 Research Problems in Marine Biology (or BIOL 4199)

Research under the supervision of a Marine Biology faculty member. May be repeated for credit, but no more than 3 hours may apply toward the Marine Biology Major.

MARS 4399 Research Problems in Marine Biology (or BIOL 4399) [3-0]

Research under the supervision of a Marine Biology faculty member. May be repeated for credit, but no more than 3 hours may apply toward the Marine Biology Major.

MARS 3416 Coral Reef Ecology (or BIOL 3416) [3-3]

The course examines the biotic and abiotic ecology of coral reefs including their zonal and community structure. Emphasis is placed on directed, field-oriented, individual research projects as a means of examining the morphology, evolutionary patterns, and ecological importance of coral reefs.

MARS 4402 Marine Zoology (or BIOL 4402) [3-3]
A study of the common marine animals, especially invertebrates in coastal waters. Particular attention is given to structural and physiological relationships. Strenuous field work required. Students must provide their own transportation to and from South Padre Island or other field trip sites.

MARS 4410 Marine Botany (or BIOL 4410) [3-3]
A study of the common local marine flora with emphasis on macroscopic algae, sea grasses and terrestrial angiosperms. Students are expected to furnish their own transportation to field laboratory sessions at South Padre Island.

MARS 4426 Marine Ecology (or BIOL 4426) [3-3]
This course is an introduction to marine ecology. It will include discussion of marine ecosystems and processes with a focus on the marine environment of South Texas.

MARS 4427 Marine Animal Field Studies (or BIOL 4427) [3-3]
This field course will offer students comprehensive field based training in the local marine fauna on South Padre Island. Students will conduct field trips to all major habitat types on South Padre Island, identify and classify marine organisms, and learn basic collecting techniques by conducting observational and experimental studies in field settings. Students are expected to stay on the facility during the field course (Student housing will be provided).

MARS 4430 Coastal Ecology (or BIOL 4430) [3-3]
This course examines the major near shore habitats and communities of the western Gulf of Mexico including: beaches, sand dunes, estuaries, salt marshes, mud flats, sea grass meadows, and rocky shores. Emphasis is placed on directed, field-oriented, group, and/or individual research projects.

3 – Biology Electives – 4 hours (4 advanced)

Choose 4 hours of advanced Biology.

C – SUPPORT COURSES – 20 HOURS (4 ADVANCED)

CHEM 2323 Organic Chemistry I
Study of the structure, properties, preparations and reactions of aliphatic and aromatic compounds, stereo chemistry, reaction mechanisms, and the use of spectroscopic techniques are included.

CHEM 2123 Organic Chemistry I Lab
An introduction to organic synthesis. Fundamental techniques such as crystallization, distillation, extraction and chromatography are discussed and applied to the preparation of organic compounds.
Prerequisites: Credit/registration in CHEM 2323.

CHEM 2325 Organic Chemistry II
Continuation of CHEM 2323. Includes a brief introduction to the chemistry of polymers, fats, carbohydrates, amino acids and proteins.

CHEM 2125 Organic Chemistry II Lab

Syntheses are more advanced, with greater emphasis on aromatic compounds. Grignard and diazonium salt preparations are included. Compounds are characterized by spectroscopic techniques. *Prerequisites:* CHEM 2123.

PHYS 1401 General Physics I

An algebra-based introduction to the principles of mechanics, fluids, heat, waves, and sound for students fulfilling a natural science requirement and premedical students. The course includes three laboratory hours a week to emphasize course concepts. *Prerequisites:* MATH 1414 or MATH 1314.

PHYS 1402 General Physics II

A continuation of PHYS 1401 covering the principles of electricity, magnetism, light, and modern physics. The course includes three laboratory hours a week to emphasize course concepts. *Co/Prerequisites:* PHYS 1401. A continuation of PHYS 1401 covering the principles of electricity, magnetism, light, and modern physics. The course includes three laboratory hours a week to emphasize course concepts. *Prerequisites:* PHYS 1401.

ENVR 3405 Oceanography

An introduction to the nature and origin of the world's oceans. Topics will cover geological, chemical, physical, and biological processes throughout the oceans. Credit may be received only in one of ENVR 3405 or GEOL 3405. *Prerequisites:* GEOL 1403 and either GEOL 1404 or BIOL 1406 (or BIOL 1487); all with a grade of 'C' or better.