- Note: BIOL 101, BOT 101, BOT 101L, BOT 130, BOT 130L, BOT 205, BOT 210, and IS 201 fulfill both a lecture (as DB or DP) and a lab (DY) requirement simultaneously.

Biological Sciences (DB)

AG 120: Plant Science

The study of plant science, morphology, anatomy, physiology classification, growth, growth regulators, and propagation. Students are required to write a 10 to 15 page research report.
Credits: 3
Lecture Hours: 2
Program: Agriculture
Lecture/Lab Hours: 2
Student Learning Outcomes:
- Describe and explain general plant structure and function in relation to plant growth and development.
- Demonstrate knowledge of horticultural principles in the cultivation of plants.
- Examine commercial agricultural enterprises for to become familiar with employment opportunities and the impact of horticulture on our lives.
- Research and report on a horticultural plant.

AG 152: OrchID Culture

An extensive study of orchid identification, breeding, growth, and culture. Students are required to write a 10 to 15 page research report.
Credits: 3
Lecture Hours: 3
Program: Agriculture
Student Learning Outcomes:
- Identify orchid species, hybrids and trace their pedigrees.
- Provide cultural requirements for each genus, including temperature, light intensity, humidity, watering, fertilizing, media composition, and pest or disease control and repotting.
- Perform traditional and in vitro propagation techniques.
- Perform orchid breeding and discuss its economic importance.
- Conduct research and submit research paper.

AG 202: Agriculture, Environment, and Society

The goal of this course is to establish foundational knowledge of agroecosystems. Emphasis is on the interrelationship among the crop plants, essential plant nutrients, social factors, and cultural practices. Key goals are to introduce students to the broad range of topics covered within agroecosystems, as well technical writing in agricultural science, and oral discussion and argument.

Credits: 3
Lecture Hours: 3
Prerequisites:
A grade of C or better in AG 120
Program: Agriculture
Recommended:
A grade of C or better in ENG 100
Student Learning Outcomes:
- Analyze and interpret information from technical and non-technical sources, with an emphasis on scientific articles.
- Discuss interrelationship between plants and animals, and the socio-economic importance of them to humans.
- Describe the relationship(s) between agriculture, society and the environment.
- Describe the concept of agroecosystems and form critical questions for in-class discussion.

ANSC 142: Anatomy and Physiology of Domestic Animals

Introduction to the anatomy and physiology of domestic animals. Compares the anatomy and function of major body systems for the cat, dog and horse, with lesser emphasis on birds, reptiles and amphibians. This course is intended for students entering veterinary technology, veterinary assisting or other animal-related fields.
Credits: 3
Lecture Hours: 3

Prerequisites:
Registration in or a grade "C" or better in ANSC 140 and ANSC 142L. Credit for or placement in ENG 100 and MATH 101. Confirmed attendance to Windward CC veterinary technology information session.
Program: Animal Sciences
Student Learning Outcomes:

- Discuss the chemical building blocks of major biological molecules.
- Describe the link between cells, tissues, organs, and organ systems.
- Contrast the structure and function of major body systems (e.g., skeletal, circulatory, respiratory, and reproductive) among companion animals and selected livestock species.
- Explain how disease and disorders disrupt the homeostasis of each of the above body systems and discuss how common veterinary medical treatments are used to restore homeostasis.

ANSC 151: Clinical Laboratory Techniques

Provides students with the background knowledge needed to perform and interpret laboratory techniques commonly used in veterinary practice. Topics include: Homeostatic relationships, cytology, histology, parisitology and clinical physiology of major body systems. Includes a discussion of common disorders affecting major body systems and the techniques used for diagnosis. This course is intended for students entering veterinary technology, veterinary assisting or other animal-related fields.
Credits: 3
Lecture Hours: 3
Prerequisites:
A grade of "C" or better in ANSC 142 and 142L.
Co-Requisites:
Registration in ANSC 151L.
Program: Animal Sciences
Student Learning Outcomes:

- Describe the procedures for safely collecting specimens from domestic animals.
- Discuss the clinical tests performed in hematology, urinalysis, clinical chemistries, and cytology.
- Compare the technologies used by automated hematology and blood chemistry machines and discuss their impacts on the accuracy and reliability of test results.
- Recognize accurate vs. erroneous results in order to provide maximum diagnostic benefit.

ANSC 152: Companion Animal Diseases and Nutrition

An introduction to the common diseases and medical care of companion animals. Topics include identification, clinical signs and symptoms, and treatment of diseases affecting companion animals. This course is intended for students entering veterinary technology or other animal-related fields.
Credits: 3
Prerequisites:
Admission in the Veterinary Technology Program and a grade of "C" or better in all completed ANSC courses.
Program: Animal Sciences
Student Learning Outcomes:

- Describe the common diseases of companion animals and identify the life stage at which the disease typically occurs.
- List the clinical signs and tests used in the diagnosis of common companion animal diseases.
- Explain the medical treatments for common companion animal diseases.
- Communicate the information that a client or owner would need in the event that a pet was diagnosed with a specific disease.

ANSC 253: Applied Pharmacology for Veterinary Technicians

This course is designed to give students a practical knowledge of drugs used in veterinary medicine. Topics include drug classification, methods of action, calculations, administration, effects and side effects. Also includes a discussion of client education, drug safety, and federal regulations governing the purchase and storage of controlled drugs. Upon successful completion, students will be able to properly calculate, dispense, and administer medications, recognize adverse reactions and maintain pharmaceutical inventory and administrative records. This course is intended for students entering veterinary technology, veterinary assisting, or other animal-related fields.
Credits: 3
Lecture Hours: 3
Prerequisites:
Admission in the Veterinary Technology Program and a grade of "C" or better in all completed ANSC courses.
Program: Animal Sciences

Student Learning Outcomes:

- Recognize groups of veterinary drugs, their mechanisms & actions, and clinically relevant side effects.
- Correctly interpret a veterinarian's pharmacy orders.
- Accurately calculate, dispense, and administer the correct form and dose of a medication.
- Describe the safe and effective manner in which vaccines must be administered.
- Maintain a controlled substances logbook in accordance with local and federal laws.
- Explain federal and state regulatory guidelines for drug purchase, storage, administration, withdrawal, disposal and inventory control.
- Accurately communicate drug information and dosing instructions to clients in order to maximize safety, compliance with prescribed therapy and successful treatment of the patient.

ANSC 261: Anesthesiology and Dentistry for Veterinary Technicians

This course will focus on dental anatomy, common dental diseases, and basic dental procedures. Topics will include proper charting, routine periodontal care, anesthesia, patient monitoring, analgesia, post-op concerns, and homecare for clients. Dental equipment and instruments will be reviewed in preparation for the concurrent lab (ANSC 261L).
Credits: 3
Lecture Hours: 3
Prerequisites:
Admission in the Veterinary Technology Program and a grade of "C" or better in all completed ANSC courses
Co-Requisites:
Co-registration in ANSC 261L.
Program: Animal Sciences
Student Learning Outcomes:

- Explain all aspects of anesthetic monitoring.
- Understand the proper operation of anesthetic delivery equipment and monitoring instruments.
- Understand and integrate all aspects of patient management for common dental procedures in companion animal species.
- Identify and provide appropriate instruments, supplies and environment to maintain asepsis during dental procedures.
- Understand the principles of routine dental care and be able to make recommendations to pet owners.
- Recognize the levels of periodontal disease and how it affects a patient's overall health.
- Identify normal dental anatomy of common veterinary species.

ANSC 262: Clinical Procedures for Large Animals

The student will learn techniques in large animal restraint, husbandry and clinical procedures and be provided some introduction to relevant large animal diseases. Biosecurity and public health will be discussed as they apply to large animal health care and husbandry. The course is appropriate for those entering animal husbandry, veterinary assisting, veterinary technology or animal science fields.
Credits: 3
Lecture Hours: 3
Prerequisites:
Admission in the Veterinary Technology Program and a grade of "C" or better in all completed ANSC courses
Co-Requisites:
ANSC 262L
Program: Animal Sciences
Student Learning Outcomes:

- Describe common zoonotic diseases of large animals as they apply to animal health and public safety.
- Discuss biosecurity and isolation procedures necessary in livestock operations.
- Describe the signs and treatment for common diseases of large animals.
- Explain anesthetic, surgical, dental, and recovery procedures for large animals.

ANSC 271: Anesthesiology and Surgical Nursing for Veterinary Technicians

This course will focus on the clinical skills necessary for safe and effective anesthesia and surgery of companion animal patients (dogs and cats). Skills such as intravenous catheter placement, proper endotracheal intubation, patient and surgical site preparation, and patient monitoring under general anesthesia will be stressed. The use and side effects of commonly used sedatives, analgesics and anesthetics will be covered. Postoperative procedures include patient monitoring and charting as well as client education for postoperative care.
Credits: 3
Lecture Hours: 3
Prerequisites:
Admission in the Veterinary Technology Program and a grade of "C" or better in all completed ANSC courses

Co-Requisites:
Co-registration in ANSC 271L
Program: Animal Sciences
Student Learning Outcomes:
- Understand the proper operation of anesthetic delivery equipment and monitoring instruments.
- Explain all aspects of anesthetic monitoring.
- Understand and integrate all aspects of patient management for common surgical procedures in companion animal species.
- Identify and provide appropriate instruments, supplies and environment to maintain asepsis during surgical procedures.
- Demonstrate understanding of routine surgical procedures including surgeries in these categories: ovariohysterectomy, cesarean section, orchiectomy, laparotomies, and orthopedic procedures.

AQUA 106: Small Scale Aquaculture

Survey of possibilities of small scale aquaculture. Application of basic biological and ecological concepts and theories to the selection, planning and design of small scale aquaculture systems.
Credits: 3
Lecture Hours: 3
Program: Aquaculture
Recommended:
Registration in AQUA 106L.
Student Learning Outcomes:
- Describe past and present aquaculture technologies.
- Plan and design a small scale aquaculture system.
- Select appropriate small scale aquaculture organisms.
- Determine the optimal conditions for cultivating small scale aquaculture organisms.
- Develop a small-scale aquaculture husbandry and management plan.
- Evaluate the economic feasibility of developing a small-scale aquaculture system.

AQUA 201: The Hawai'i Fishpond

An introduction into the history, development, biology and ecology, management, restoration, and future of Hawaiian fishponds. This course will study traditional Hawaiian fishponds, merging traditional knowledge with the principles of modern Western science.
Credits: 3
Lecture Hours: 3
Program: Aquaculture
Recommended:
Registration in AQUA 201L.
Student Learning Outcomes:
- Explain the process and philosophical basis of scientific inquiry.
- Distinguish between the types of traditional Hawaiian fishponds, the history of their construction and use throughout the Hawaiian Islands, how and where they were constructed, their operation and management, their characteristics, and their biota.
- Describe the oceanography, biology and ecology of Hawaiian fishponds.
- Describe the basic principles of aquaculture, including pond dynamics, feeding regimes, cultivated species propagation and growth, disease management, production, harvesting and maintenance.
- Discuss the status of Hawaiian fishponds in modern times, including their restoration and their future.

BIOL 100: Human Biology

Introduction to structure and functions of cells, tissues, organs, and systems of the human body. Topics related to physical fitness, nutrition, health, and disease. Not intended for science majors. Students who have received credit for or are currently enrolled in ZOOL 101 may not receive credit for BIOL 100.
Credits: 3
Lecture Hours: 3
Program: Biology
Student Learning Outcomes:
- Use scientific reasoning to answer a question about phenomena in our natural universe or to determine the validity of a scientific claim.
- Distinguish between living things and inanimate objects.
- Relate cell structure and function to the architecture and functioning of the human body.
- Use information about the form (anatomy) and function (physiology) of the human body to make effective decisions about human health.
- Describe the interrelationships between humans and their environments.

BIOL 101: Biology and Society

Historical development of scientific concepts, characteristics, and interaction of science and society from the perspective of biological sciences.

Credits: 4
Lecture Hours: 3
Prerequisites:
Credit in MATH 25, 26, 29, 82 or higher or equivalent preparation; and placement in ENG 100, or consent of instructor.
Program: Biology
Student Learning Outcomes:

- Distinguish science as a way of knowing from other epistemological systems.
- Discuss the historical development of the discipline of biology into what it is today, relating the contributions made by significant individuals and concepts of the past to modern biology.
- Explain the major integrating principles of biology.
- Explain the origin and organization of the diversity of life on Earth.
- Describe how living systems function, relating structure to function, at all levels within the hierarchy of life from molecules to the biosphere.
- Solve problems in inheritance and genetics.
- Present informed, rational and objective opinions on biologically-related issues important to human society.
- Use the scientific method of inquiry to investigate biological phenomena.
- Apply the concepts learned to an experimental and hands-on observational setting.
- Collect, reduce, and interpret biological data.
- Prepare written objective reports describing and interpreting experimental and observational results.
- Demonstrate the use of some of the standard tools and methods of the biological scientist, such as microscopes, scales, spectrophotometers, computers, dissection dichotomous keys, and other analytical tools.
- Identify the major systematic groups to which specimens of living things belong.

BIOL 124: Environment and Ecology

A study of human ecology through the analysis of the interrelationships between science and technology, the means these provide for manipulation of environment and the effects of this manipulation on the environment and on human populations. Lecture/field trip course designed for non-science majors.
Credits: 3
Lecture Hours: 3
Program: Biology
Student Learning Outcomes:

- Explain the process and philosophical basis of scientific inquiry.
- Describe the basic principles of ecology, including population ecology, community ecology, and ecosystem function.
- Describe the characteristics of the major biomes and ecosystems of the Earth.
- Describe the interrelationships between land, sea, the atmosphere and the living things that occupy these environments.
- Discuss the role that humans play in affecting the characteristics of the environment.
- Evaluate current environmental issues and problems including the solutions and management practices that have been used or offered to address these issues and problems.

BIOL 171: Introduction to Biology I

First semester of introductory biology for all life science majors. Topics include: Overview of the science of biology; Cell structure, chemistry, growth, and reproduction; Classical, chromosomal and molecular genetics; Evolution, phylogeny and systematics; and Biology and diversity of viruses and bacteria.
Credits: 3
Lecture Hours: 3
Program: Biology
Recommended:
High school chemistry or college chemistry and registration in BIOL 171L.
Student Learning Outcomes:

- Develop and evaluate a scientific hypothesis.
- Describe cell structure and function.
- Describe how genetic characteristics are past from generation to generation and how they are manifested into the characteristics of the whole organism.
- Explain how the process of biological evolution influenced the history of life on our planet.
- Classify living things into a hierarchical system of groups based upon morphology, genetics, and phylogeny.
- Describe the characteristics, systematics, and biology of viruses and bacteria.

BIOL 172: Introduction to Biology II

Continuation of BIOL 171. Topics include: Origin of eukaryotic organisms, their general characteristics, life cycles, systematics and evolution; Anatomy, physiology and classification of higher plants; Anatomy, physiology, behavior and classification of animals; and Basic ecological principles.
Credits: 3
Lecture Hours: 3
Prerequisites:
Credit for BIOL 171
Program: Biology
Recommended:
Concurrent enrollment in BIOL 172L
Student Learning Outcomes:

- Contrast the general characteristics, life cycles, evolution and systematics of eukaryotic organisms.
- Describe the detailed biology of higher plants.
- Describe the detailed biology of animals.
- Explain how interacting environmental factors (physical, chemical and biological) determine the distribution and abundance of living things.

BIOL 200: Coral Reefs

Introduction to the biology, ecology and geology of stony corals and the reef structures they build. Topics include, but not limited to, the following: photobiology, biochemistry, physiology, reproduction, ecology, biogeography and evolution of stony corals; contributions made by other members of the coral reef community, such as algae, invertebrates, fish, sea turtles, sea birds, and marine mammals; reef formation and geomorphology; corals as resources for human utilization and the impacts of human activities upon reefs throughout the world. Emphasis will be on Hawai'i's coral reefs, but comparisons will be made among reefs from other areas.
Credits: 3
Lecture Hours: 3
Program: Biology
Student Learning Outcomes:

- Explain the process and philosophical basis of scientific inquiry.
- Distinguish between living things and inanimate objects.
- Describe the classification of living things, the kinds of criteria used to classify them, and the formal protocol in naming them.
- Demonstrate an understanding of the biology of corals (e.g., systematics & classification, soft tissue morphology and cytology, skeletal morphology, endosymbiosis with zooxanthellae, modes of feeding, reproduction, environmental factors that influence growth and distribution, and evolution) with an emphasis on Hawaiian corals.
- Describe the ecological relationships among the living components of coral reef communities and their interactions with the physical environment.
- Describe the types of reefs and the processes that create and shape them.
- Describe the resources that coral reefs provide, especially to Pacific island nations and states.
- Describe the impacts of human activities on coral reefs and the significance of these impacts to Pacific island nations and states.

BIOL 265: Ecology and Evolutionary Biology

Principles of ecology and evolution for life science majors stressing integrated approach and recent advance.
Credits: 3
Lecture Hours: 3
Prerequisites:
Credit for BIOL 171/171L and 172/172L; or one year of introductory college biology plus labs; or equivalent preparation; or consent of the instructor
Co-Requisites:
BIOL 265L; or consent of instructor
Program: Biology

Student Learning Outcomes:

- Apply the appropriate terminology when describing, explaining, and applying ecological theory.
- Summarize abiotic environmental features including climate, soil and geographical structure.
- Identify the biological and physical structures of ecosystems, major biogeochemical cycles, and energy flow.
- Examine the basic principles of population dynamics including birth and mortality rates, population growth models, life history strategies, competition and carrying capacity.
- Define the interactions within communities including interspecific competition, predation, and mutualism.
- Describe the evolutionary adaptations of organisms to their environment.
- Give examples of evolutionary principles that produced unique island communities.
- Evaluate the impact of habitat alteration and destruction, loss of biodiversity, and effects of alien species.
- Interpret and produce tabular and graphical representations of information, including tables, graphs, and maps.
- Locate and critique the value of printed and online resources.
- Evaluate the consequences of population growth, increased resource use and pollution on global ecosystems.

BIOL 275: Cell and Molecular Biology

Integrated cell and molecular biology for life science majors. Modern advances in recombinant DNA technology.
Credits: 3
Lecture Hours: 3
Prerequisites:
"C" or better in BIOL171/171L and CHEM 272/272L or consent of instructor
Co-Requisites:
BIOL275L or consent of instructor.
Program: Biology
Student Learning Outcomes:

- Describe the principles of cytology including cell organization, structures and functions.
- Describe cell biochemistry including macromolecules of the cells, enzymes, membrane transport, cell signaling, and energy flow in cells during respiration and photosynthesis.
- Describe the principles of genetics including DNA replication, protein synthesis, mitosis, meiosis, genetic recombination and gene expression.

BOT 101: General Botany

Introduction to plant structure, function, reproduction, and evolution; plants in relation to the environment and human activities. Lecture course.
Credits: 3
Lecture Hours: 3
Co-Requisites:
Registration in BOT 101L
Program: Botany
Student Learning Outcomes:

- Discuss basic concepts of plant morphology, anatomy, physiology, cytology, taxonomy and genetics.
- Discuss life cycles of division in Thallophyta, Bryophyta, Pteridophyta and Spermatophyta.
- Discuss interrelationship between plants and animals, and socio-economic importance of plants on humans.
- Discuss plant biotechnology.

BOT 130: Plants in the Hawaiian Environment

Introduction to the evolution of plant communities and species of Hawaiian ecosystems; ecological interactions; observations, identification and systematics of native and introduced flora.
Credits: 3
Lecture Hours: 3
Prerequisites:
Credit for or registration in BOT 130L
Program: Botany
Student Learning Outcomes:

- Discuss geological history of the Hawaiian Islands and natural history of plants in Hawai'i.
- Discuss the arrival, establishment, major evolutionary trends and adaptive radiation of some of the surviving native species.
- Discuss natural and human-mediated changes in the ecosystems, plant succession, and interaction between native and introduced species of plants.
- Discuss botanical terminology for use in identifying native Hawaiian plants.

BOT 160: Identification of Tropical Plants

Nontechnical course in identification of common plants of tropics, including native and introduced flora.
Credits: 3
Lecture Hours: 3
Program: Botany
Student Learning Outcomes:

- Operate dissecting microscopes.
- Recognize unique vegetative and generative characteristics of plant families.
- Use manuals, flora and monographs to identify plants.
- Prepare herbaria.

BOT 205: Ethnobotanical Pharmacognosy

A study of medicinal plants of Hawai'i, their characteristics, plant extraction, isolation and identification of their chemical constituents for possible uses in pharmaceuticals or in their natural state, and bioproduct manufacturing. This course is designed to train students for careers in plant and medical biotechnology. Lecture and laboratory/fieldtrip course.

Credits: 4
Lecture Hours: 3
Prerequisites:
Credit for or registration in any of these courses: BOT 101, BOT 105, BOT 130, MICR 130, MICR 140, BIOL 172/172L, CHEM 152/152L or consent of instructor.
Program: Botany
Recommended:
High school biology, chemistry and math.
Student Learning Outcomes:

- Discuss theories and principles in the study of medicinal and nutritious plants.
- Discuss ethics, intellectual property rights and conservation of traditional knowledge.
- Perform Laboratory activities: plant extraction, distillation, bioassay tests, analysis of chemical constituents for possible uses in pharmaceuticals and nutraceutical products.
- Produce lab reports using the standard scientific format.

BOT 210: Phytobiotechnology

Introduction to practical aspects of Plant Biotechnology. Topics include micropropagation techniques, such as plant tissue, cell and protoplast cultures: DNA-based technologies, such as DNA extraction, DNA sequencing, PCR; and methods of plant genetic engineering. This course is designed to train students for careers in advanced agriculture technology and industry.

Credits: 4
Lecture Hours: 3
Prerequisites:
Credit for or registration in BOT 101, or AG 152, or MICR 130 and MICR 140, or BIOL 171 and 171L. Placement into MATH 100 or higher.
Program: Botany
Recommended:
High school biology or chemistry, MATH 24.
Student Learning Outcomes:

- Apply the principles of genetics.
- Discuss and perform experiments including plant/bacterial/ human DNA/protein electrophoresis, Southern and Western blots, plant genetic engineering using biolistic bombardment and bacterial gene transformation.
- Apply bioinformatics and DNA sequencing.
- Discuss bioethical issues, risks and benefits of biotechnology.
- Produce lab reports using the standard scientific format.

FSHN 185: Human Nutrition

An introductory level biological science course which integrates basic concepts of science with the study of human nutrition. Designed for students who want an introduction to nutrition, as well as those who later choose to major in it.
Credits: 3
Lecture Hours: 3

Prerequisites:
Placement in ENG 100 and credit in Math 25, 26, 29, or 82 or higher, placement into Math 103 or higher, or consent of instructor.
Program: Food Science and Human Nutrition
Student Learning Outcomes:

- Describe the six categories of nutrients and evaluate the nutrient adequacy of a diet.
- Identify factors influencing eating habits.
- Correctly interpret and evaluate information on food labels, packages and product advertising based on generally accepted scientific methods and standards.
- Define various types of malnutrition and discuss their causes, cures, and associated health effects.
- Discuss current issues related to the safety of the food supply, using concepts from toxicology.
- Describe physiological changes that occur during the lifecycle and explain the changes in nutrient needs that accompany these changes.
- Discuss various environmental and ecological conditions, which interact with human nutrition, both locally and globally.

IS 201: The Ahupua‘a

Study of the traditional Hawaiian approaches to natural resource development, utilization, exploitation, and management. The ahupua'a, as the traditional Hawaiian unit of land and sea subdivision, beginning in the upland forests, stretching across lower elevations, past the shoreline to the edge of the reef, will be evaluated as a microcosm of an integrated ecosystem and as a model for natural resource management and sustainability.

Credits: 3
Lecture Hours: 2
Program: Interdisciplinary Studies
Recommended:
BIOL 101 or BIOL 124 or similar preparation.
Student Learning Outcomes:

- Describe how the Hawai‘i's unique geological formation affects its sustainable natural resources.
- Describe how the ancient migration begins to affect the management of its natural resources and the socio-political fabric of the "new land."
- Describe the agri-spiritual relationship between plant and mahi‘ai; and the fish and the lawai‘a.
- Discuss the ancient and present management value of water.
- Describe and assist in the reconstruction of lo‘i kaloandlokoi‘a.
- Describe and discuss the current resources management practices, which augment or negate ancient practices.
- Research and replicate an artifact of his or her choice.

MICR 130: General Microbiology

Fundamentals of microbiology, growth, development, and classification of bacteria, viruses, protozoa, fungi and algae; roles of microorganisms in the environment and human affairs: medical microbiology, immunology, and applied microbiology for food sanitation and public health.
Credits: 3
Lecture Hours: 3
Program: Microbiology
Student Learning Outcomes:

- Describe the main morphological characteristics, growth, reproduction and classification of algae, bacteria, fungi, protozoa, viruses and helminthes.
- Discuss etiologies, reservoirs of infection, modes of transmission, signs, symptoms, and treatments and/or methods of prevention of common infectious diseases of humans.
- Describe the basic principles of molecular genetics as they relate to cell division, mutation, genetic engineering, protein synthesis, bacterial virulence, and antibiotic resistance.
- Describe pathogenicity, immunity and allergies.

OCN 102: Introduction to the Environment and Sustainability

This course will introduce students to the basic principles of environmental science and sustainability as they apply to analysis of environmental systems on a global scale. The integrated natures of ocean, terrestrial and atmospheric systems will be introduced by first introducing the Earth's major ecosystems and then discussing their coupled integration. The concepts of sustainability will be infused into the course with an emphasis on the importance of sustaining resources and mitigating pollution to ecosystems. This issue of sustainability will be approached from the perspective of the impact that 9 billion or more people will impose upon the planets resources and ecosystems. Similarly, this course will include the concepts of sustainability with Native Hawaiian culture and indigenous knowledge.
Credits: 3
Lecture Hours: 3
Program: Oceanography

Student Learning Outcomes:

- Define the Earth's major ecosystems and the major flows of matter and energy through them.
- List the identity, source and action of the major pollutants that disrupt these ecosystems.
- Relate the carrying capacities of each major ecosystem relative to these pollutant loads, as well as the consequences to the environment if they fail.
- Define the fundamentals of sustainability metrics in terms of major impact categories (into which pollutants and activities are grouped) and their units.
- State how the cultural practices and indigenous knowledge of the Native Hawaiians relate to sustainability.

PHYL 141: (Formerly Zool 141) Human Anatomy and Physiology I

The first semester of a two-semester course in human anatomy and physiology which includes a study of human embryology, gross anatomy, microanatomy, physiology, pathology, and homeostatic relationships. This course is intended for students entering health care or medically related fields such as nursing, physical therapy and medical technology.
Credits: 3
Lecture Hours: 3
Prerequisites:
High school chemistry or equivalent preparation or consent of instructor.
Program: Physiology
Recommended:
High school biology, BIOL 100, BIOL 101 or ZOOL 101; registration in ZOOL 141L.
Student Learning Outcomes:

- Discuss the major chemical elements found in the human body and describe the different ways in which these elements combine to form molecules and compounds.
- Understand the functions of cellular organelles, and be able to trace the path of protein manufacture in the cell.
- Compare and contrast the physical, chemical, and biological factors governing the transport of materials across the cell membrane.
- Discuss the link between cells and tissues and describe how tissue structure determines its suitability for secretion, absorption, support, or protection.
- Use standard medical terminology to describe body positions and the orientations.
- Describe the anatomy and function of the integumentary, skeletal, muscular, and nervous systems, and discuss how these systems maintain homeostasis in the human body.
- Discuss how negative feedback maintains homeostasis in each of the above body systems. Also, be able to explain how disease and disorders disrupt the homeostasis of each of the above body systems and discuss how common medical treatments and drugs are used to restore homeostasis.
- Write a research paper on a disease affecting one of the body systems using primary and secondary scientific literature.

PHYL 142: (Formerly Zool 142) Human Anatomy and Physiology II

The second semester of a two-semester course in human anatomy and physiology which includes a study of human embryology, gross anatomy, microanatomy, physiology, pathology, and homeostatic relationships. This course is intended for students entering health care or medically related fields such as nursing, physical therapy and medical technology.
Credits: 3
Lecture Hours: 3
Prerequisites:
Credit for ZOOL 141 or equivalent preparation or consent of instructor.
Program: Physiology
Recommended:
Registration in ZOOL 142L.
Student Learning Outcomes:

- Describe how lipids, carbohydrates, proteins and nucleic acids are digested, assimilated, and catabolized to obtain energy and raw materials.
- Describe the anatomy and function of the circulatory, lymphatic, endocrine, digestive, urinary, and reproductive systems and discuss how these systems maintain homeostasis in the human body.
- Describe the link between the anatomy of human tissues and organs and their functions within the human body.
- Discuss how negative feedback maintains homeostasis in the human body.
- Explain how disease and disorders disrupt the homeostasis of each of the above body systems and discuss how common medical treatments and drugs are used to restore homeostasis.
- Write a research paper on a disease affecting one of the body systems using primary and secondary scientific literature.

PHRM 203: General Pharmacology

Covers a wide range of drugs with emphasis on sites and mechanism of action, toxicity, fate and uses of major therapeutic agents. This course is intended for students in nursing and allied health fields.
Credits: 3

Lecture Hours: 3
Prerequisites:
Grade of "C" or better in ZOOL 141 and ZOOL 142.
Program: Pharmacology
Recommended:
College level chemistry.
Student Learning Outcomes:

- Describe the basic mechanisms of drug action.
- Demonstrate knowledge of the terminology and special concepts useful in the study of pharmacology.
- Describe how differences between individuals govern their response to drugs.
- Define how drugs are processed and bio transformed by the body.
- Identify frequent complications and side effects associated with the major drug classes.
- Describe significant interactions between drugs.
- Use information from the pharmacokinetics of a specific drug to determine dosing schedules and best route of drug administration.
- State the therapeutic uses for each major drug group.

ZOOL 154: Exercise for Wellness

The course will introduce students to the field of exercise, including a discussion of the underlying physiology, clinical responses, and the recommended medically related remediation. Exercise will be analyzed as an open energy system, supported by the major body systems, including cardiovascular, pulmonary, skeletal and neuromuscular systems. Important factors that will be considered include the frequency, intensity, type, and duration/time of exercise as well as the impact of gender, age, purpose, lifestyle and your body composition and metabolic status.
Credits: 3
Lecture Hours: 3
Program: Zoology
Recommended:
BIOL 100 or ZOOL 101 or ZOOL 141 and ZOOL 142.
Student Learning Outcomes:

- Define basic terms, concepts and principles of exercise, fitness, and wellness.
- Describe the fundamental classification of exercise biology and its underlying processes.
- Discuss the relationships between exercise and health.
- Explain the specificity of exercise and its multiple modes of application and related responses.
- Describe guidelines for assessing and planning a fitness- wellness program.
- Contrast Western and Eastern approaches to wellness.

ZOOL 200: Marine Biology

Biological, physical, and chemical characteristics, flora and fauna, and interactions of components of marine ecosystems; survey of marine environments; utilization, exploitation, pollution, and conservation of marine resources; with special emphasis on the Hawaiian marine environment.
Credits: 3
Lecture Hours: 3
Program: Zoology
Recommended:
Registration in ZOOL 200L.
Student Learning Outcomes:

- Explain the process and philosophical basis of scientific inquiry.
- Distinguish between living things and inanimate objects.
- Demonstrate an understanding of the physical and chemical characteristics of the marine environment, especially those of the Hawaiian marine environment, and how they impact marine life.
- Communicate knowledge of the diversity of marine organisms, especially Hawaiian species.
- Exhibit an appreciation of the interaction between structure and function of marine life and how marine organisms are taxonomically related.
- Illustrate and provide examples of the ecological role of and relationships between marine organisms.
- Describe the major life zones of the ocean and the adaptations of living things relevant to being a successful species in these zones.
- Recognize and suggest solutions to the negative impacts of human activities on the marine environment.
- Research and write, using the language of the field, about a marine biology topic.

ZOOL 254: Exercise Therapy

This course introduces selected concepts, principles and practices of physical activity that affect human wellness and fitness throughout all stages of life. In particular, the concepts of exercise specificity, adaptation, and remediation are presented as they affect human growth and development, and the

aging process. The clinical concept of hypokinetic disease (under activity) is presented and its counterpart, clinical exercise therapy (Rx dosage) for purposes of preventative health application and remediation. Comparative study of both Western and Eastern exercise regimens are included in the context of their clinical contribution to wellness.
Credits: 3
Lecture Hours: 3
Program: Zoology
Recommended:
BIOL 100 or ZOOL 101 or ZOOL 141 and ZOOL 142.
Student Learning Outcomes:

- Define basic terms, concepts and principles of exercise, fitness, and wellness.
- Describe the fundamental classification of exercise biology and its underlying processes.
- Discuss the relationships between exercise and health.
- Explain the specificity of exercise and its multiple modes of application and related responses.
- Describe guidelines for assessing and planning a fitness-wellness program.
- Comprehend the professional literature and correctly interpret and categorize new developments/approaches in the field.
- Apply scientific logic to the selection and application of the many commercial products and procedures inundating the field.
- Contrast Western and Eastern approaches to wellness.

Physical Sciences (DP)

AERO 150: Introduction to Rocketry

This is a general introductory course to rocket science. Principles of propulsion, aerodynamics, and safety protocols for design and ground operations are stressed.
Credits: 3
Lecture Hours: 3
Program: Aeronautics
Recommended:
Credit in Math 25, 26, 29, 82, or higher.
Student Learning Outcomes:

- Demonstrate a solid understanding of propulsive methods, especially as pertains to space.
- Solve applicable problems of spacecraft kinematics, dynamics, and energy considerations.
- Apply the laws of planetary motion and celestial mechanics.
- Outline the historical development of manned and unmanned space flight.
- Identify and describe the appropriate instruments, detectors and space probes used by astronomers and space scientists to explore the solar system, especially in the area of remote sensing.
- Discuss the future of space colonization and exploitation.

ASTR 110: Survey of Astronomy

Introduction to the astronomical universe for non-science students.
Credits: 3
Lecture Hours: 3
Program: Astronomy
Student Learning Outcomes:

- Outline the development of astronomy from ancient times to present and explain the role of the scientific method in this historic context.
- Describe and explain the apparent motions of the celestial bodies, especially as related to naked-eye observations.
- Identify the appropriate instruments used by astronomers to understand the universe.
- Outline the origins of our solar system and appraise the leading cosmological theories of the origin of the universe.
- Describe the physical and chemical properties of the objects in our solar system and apply the concept of comparative planetology.
- Describe the physical and chemical nature of stars, and especially our sun, and apply the astronomical techniques used to measure stellar properties.
- Outline the evolutionary stages in a star's life and compare and contrast the structure of our Milky Way and other galaxies.
- Apply astronomical concepts to the search for extraterrestrial life.

ASTR 130: Introduction to Archaeoastronomy

Introduction to the interdisciplinary study of cultures and astronomy for non-science majors. Topics include naked-eye astronomy, myths and rituals, calendar systems, architectural alignments and navigation.

Credits: 3
Lecture Hours: 3
Program: Astronomy
Recommended:
ASTR 110.
Student Learning Outcomes:

- Describe and explain the observable daily motions of celestial bodies.
- Identify the phases of the moon and explain what causes them.
- List some cultural associations of the planets.
- Identify and use measurement tools for determining astronomical alignments.
- Illustrate how astronomical knowledge can be used in navigation.
- Compare and contrast how different cultures used astronomical knowledge.
- Assess the strengths and weaknesses of an interpretation of evidence from an archaeoastronomy site.
- Explain how culture and science are interrelated.

ASTR 180: Planetary Astronomy

A survey of modern solar system astronomy with emphasis on the underlying physical principles. Topics discussed include the celestial sphere and aspects of the night sky, the structure and evolution of the Sun's planetary system, comparative planetology, and theories of the formation of planetary systems. Intended for science majors and prospective science teachers.
Credits: 3
Lecture Hours: 3
Program: Astronomy
Recommended:
The student should have a good operational familiarity with high school algebra.
Student Learning Outcomes:

- Outline the development of planetary astronomy from ancient times to present and explain the role of the scientific method in this historic context.
- Describe the major geological and atmospheric features of the objects in our Solar System.
- Describe the physical and chemical properties of the objects in our solar system and apply the concept of comparative planetology.
- Outline the origins of our Solar System and formulate models that explain the different physical and chemical characteristics of objects within the Solar System.
- Describe the properties of our Sun and their effects on objects in the Solar System.
- Outline techniques for discovering extrasolar planets and extraterrestrial life.

ASTR 181: Stellar Astronomy

A survey of modern stellar, galactic, and extragalactic astronomy, with emphasis on the underlying physical principles. Topics covered include stellar structure, interstellar environments and the formation of stars, stellar evolution and death, the structures of galaxies, and cosmology. Intended for science majors and prospective science teachers. The student should have a good operational familiarity with high school algebra.
Credits: 3
Lecture Hours: 3
Program: Astronomy
Recommended:
The student should have a good operational familiarity with high school algebra; credit in ASTR 110 and/or ASTR 180.
Student Learning Outcomes:

- Outline the development of stellar astronomy from ancient times to present and explain the role of the scientific method in this historic context.
- Identify the appropriate instruments used by astronomers to understand the universe and describe the nature of electromagnetic radiation and its role in deciphering the mysteries of stellar astronomy.
- Describe the physical and chemical nature of stars, and especially our sun, and apply the astronomical techniques used to measure stellar properties.
- Outline the evolutionary stages in a star's life, including the role of the interstellar medium.
- Compare and contrast the structure of our Milky Way and other galaxies.
- Outline and appraise the leading cosmological theories of the origin of the universe.
- Apply astronomical concepts to the search for extraterrestrial life.

ASTR 250: Observational Astronomy

An introduction to the tools and techniques of observational astronomy: astronomical time and coordinate systems, photometric systems and magnitudes, principles of telescopes and their operation, introduction to modern astronomical instruments, analysis of astronomical data. Includes planetary, solar and stellar observations.
Credits: 3

Lecture Hours: 3
Prerequisites:
Credit for ASTR 110; or ASTR 180 and ASTR 181
Program: Astronomy
Recommended:
Student should have operational familiarity with high school algebra and basic trigonometry.
Student Learning Outcomes:

- Use appropriate celestial charts and astronomical time system to identify and locate celestial objects, such as stars, nebulae, galaxies, planets, satellites and asteroids.
- Describe the primary functions of an astronomical telescope and major detectors, such as spectrometers and photometers.
- Apply basic principals in planetary remote sensing and image processing.
- Outline astronomical techniques involved in observing planetary and stellar objects, such as variable stars, asteroids and the Sun and Moon.
- Compare and contrast the research involved in optical, radio, infrared and cosmic ray astronomy.
- Use appropriate techniques to analyze astronomical data.

ASTR 281: Space Explorations

Current topics in planetary exploration, extraterrestrial life, and space resources and colonization.
Credits: 3
Lecture Hours: 3
Prerequisites:
Credit for ASTR 110 or consent of instructor.
Program: Astronomy
Student Learning Outcomes:

- Outline the characteristics and origins of objects in our solar system, including the sun, planets, moons, meteoroids, asteroids and comets.
- Compare and contrast terrestrial and Jovian worlds and apply geological and atmospherical concepts to comparative planetology.
- Explain the effects and implications of collisional impacts on planetary surfaces.
- Apply the laws of planetary motion and celestial mechanics.
- Outline the historical development of manned and unmanned space flight.
- Identify and describe the appropriate instruments, detectors and space probes used by astronomers and space scientists to explore the solar system, especially in the area of remote sensing.
- Discuss the future of space colonization and exploitation.
- Discuss the nature and origin of life on earth and apply the astronomical concepts related to the search for extraterrestrial life.

ASTR 294V: Special Topics in Astronomy

This course covers current topics in astronomy. The course is designed to have variable credit to coincide with the rigor of the topic. May be repeated up to 8 credits with different topics. A course description will be presented in the schedule of classes.
Credits: 1-4
Lecture Hours: 1
Prerequisites:
Credit for ASTR 110 or consent of instructor.
Program: Astronomy
Student Learning Outcomes:

- Identify the important concepts and facts presented for the topic under examination.
- Make inferences and draw conclusions from the special topics under discussion.
- Apply skills appropriate to the topic under discussion.
- Evaluate the science and technology of astronomy and space science.

ATMO 101: Introduction to Weather and Climate

Introductory (DP) Diversification Physical Science course for all undergraduates in any major. A non-mathematical introduction to basic atmospheric variables, Earth's past climates, global warming, air pollution, El Nino, hurricanes, tornadoes, and forecasting weather in Hawai'i.
Credits: 3
Lecture Hours: 3
Program: Atmospheric Sciences
Student Learning Outcomes:

- Describe the components, processes and resulting weather patterns in the atmosphere.
- Interpret the components of weather maps, and forecast weather.
- Apply the scientific method and theories and concepts of meteorology (atmospheric physics) to explain major weather systems.
- Explain critically the relationship between humans and the atmospheric environment.

BIOC 141: Fundamentals of Biochemistry

Biological chemistry focusing on the integration of concepts from general, inorganic, and biochemistry and their application to living systems. Satisfies the one-semester chemistry requirement for pre-nursing and pre-dental hygiene majors.
Credits: 3
Lecture Hours: 3
Prerequisites:
"C" or better in MATH 25, 26, 28, 29, 75X or higher.
Program: Biochemistry
Student Learning Outcomes:

- Utilize precise chemical language to effectively communicate biochemical and allied health- related concepts and results.
- Analyze and apply appropriate procedures for solving biochemical and allied health-related calculations involving solids, liquids, gases, and solutions.
- Relate the location of an element in the periodic table to its electronic structure and chemical reactivity.
- Describe ionic and covalent bonding theories and apply them to the construction of proper Lewis structures and prediction of molecular characteristics.
- Relate biochemical and allied health-related concepts, theories and laws to everyday phenomena.

CE 270: Applied Mechanics I

This course is a study of equilibrium of rigid bodies under the action of forces and the application of the principles of mechanics to solve static problems in engineering.
Credits: 3
Lecture Hours: 3
Prerequisites:
Physics 170; credit for or registration in MATH 243 (formerly MATH 231) or consent of instructor
Program: Civil Engineering
Student Learning Outcomes:

- Solve problems involving forces, resultant and static equilibrium and their application to rigid bodies.
- Analyze equilibrium of rigid bodies in two and three dimensions.
- Solve problems involving center of gravity, centroids, couples, and moments of inertia.
- Analyze engineering structures subjected to concentrated loads, distributed loads, and frictional forces.
- Utilize abstract thinking and analytical reasoning in the analysis of word problems dealing with mechanical structures.
- Apply calculation techniques to dynamic problems in engineering.

CHEM 100: Chemistry and Society

Introduction to chemistry for non-science majors. Discussion of basic chemistry concepts and their application to everyday life. Provides a survey of basic concepts and applications of chemistry with emphasis on the role of chemistry in the real world. This is suitable for students who have little or no background in chemistry and serves to fulfill a general education physical science core course for the nonscience major or as a preparatory course for CHEM 151 or BIOC 141.
Credits: 3
Lecture Hours: 3
Program: Chemistry
Student Learning Outcomes:

- Describe the relationship between properties and structure of matter.
- Name chemicals, balance chemical and nuclear equations.
- Solve problems involving mole and mass ratios in chemical reactions.
- Identify the types of chemical reactions (i.e. acid-base, redox, nuclear) and their applications to everyday lives.
- Explain the chemistry of household chemicals, and the composition of air and water.
- Apply knowledge of a specific chemical concept to a current environmental, health, industrial, or technological issue or condition by writing a short research paper.

CHEM 151: Elementary Survey of Chemistry

Provides the student with an adequate background in the fundamentals of chemistry. Covers the basic language and quantitative relationships of chemistry, including atomic structure, chemical bonding, structure-property relationships, chemical reactions. Prerequisite to CHEM 152 for majors in medical technology and nursing and other allied health and science-related fields, or can be taken as a preparatory course for CHEM 161.
Credits: 3
Lecture Hours: 3

Prerequisites:
Credit in MATH 24, 25, 26, 28, 29, 75X or higher, and placement in ENG 23 or higher.
Program: Chemistry
Student Learning Outcomes:

- Predict properties of chemical elements based on their atomic structure and their location in the Periodic Table.
- Name chemical compounds, balance chemical and nuclear reactions.
- Predict properties of chemical compounds based on chemical bonding, molecular shapes, and polarity.
- Calculate mass relationships in chemical reactions and the quantity of matter in gaseous chemicals and chemical solutions.
- Predict the products of common chemical reactions.
- Apply knowledge of chemical concepts to a current environmental, health, industrial, or technological issue or condition by writing a short research paper.

CHEM 152: Survey of Organic and Bioorganic Chemistry

Structure, nomenclature, properties and reactions of organic compounds will be studied with emphasis on those compounds of practical importance in life science and related fields.
Credits: 3
Lecture Hours: 3
Prerequisites:
Credit for CHEM 151 or equivalent or consent of instructor.
Program: Chemistry
Student Learning Outcomes:

- Construct molecular models and use these to describe chemical structure, geometry and physical properties.
- Identify, classify and name organic and biochemical compounds.
- Predict products of fundamental organic reactions.
- Use the vocabulary on organic chemicals and reactions in metabolism and other biochemical applications.
- Explain the role of enzymes in metabolism.
- Apply knowledge of biochemistry concepts to discuss the genetic cause of a metabolic disorder in a short research paper..

CHEM 161: General Chemistry I

Basic principles of inorganic chemistry with an emphasis on problem solving. First course of a two-course sequence designed to meet the one-year General Chemistry requirement for pre-med, science and engineering majors. Topics include chemical calculations, electronic structure, chemical bonding, states of matter and solutions.
Credits: 3
Lecture Hours: 3
Prerequisites:
A grade of "C" or better in Math 103 or higher, or placement into Math 135 or consent of instructor
Co-Requisites:
Registration in CHEM 161L.
Program: Chemistry
Recommended:
Student should have taken high school chemistry, CHEM 100, or CHEM 151.
Student Learning Outcomes:

- Use the mole concept in solving stoichiometry problems involving solids, liquids, gases and solutions.
- Balance chemical equations, classify reactions, identify and analyze the role of the chemicals involved in chemical reactions.
- Predict the behavior of gases while undergoing changes in volume, pressure, temperature and quantity.
- Manipulate thermochemical equations and calculate the amount of energy involved in chemical reactions.
- Predict physical and chemical properties of elements based on electronic structure and location in the Periodic Table.
- Predict physical and chemical properties of compounds based on chemical bonding, geometry and intermolecular interactions.

CHEM 162: General Chemistry II

Second course of a two-course sequence designed to meet the one-year General Chemistry requirement for pre-med, science and engineering majors. Topics include thermochemistry, kinetics, acid-base equilibrium, solubility equilibrium and electrochemistry. Emphasis on problem solving.
Credits: 3
Lecture Hours: 3
Prerequisites:
A grade of "C" or better in CHEM 161, credit for or registration in MATH 135, or consent of instructor
Co-Requisites:
CHEM 162L.
Program: Chemistry

Student Learning Outcomes:

- Predict properties of pure substances using phase diagrams.
- Predict properties (boiling point, melting point, osmotic pressure, vapor pressure) of solutions based on concentration.
- Determine reaction rate law and calculate rate constants and half-life based on experimental data.
- Calculate the equilibrium concentration of chemicals in solution involved in precipitation, and acid-base and reactions.
- Predict spontaneous reactions based on enthalpy and entropy considerations.
- Determine the electrochemical potential of redox reactions.

CHEM 272: Organic Chemistry I

This is the first semester course in organic chemistry intended for science majors. Topics to be covered include structure, properties, nomenclature, reactions, reaction mechanisms, stereochemistry and spectroscopy of alkanes, alkenes, alkynes, alkyl halides, alcohols and their applications to biology.
Credits: 3
Lecture Hours: 3
Prerequisites:
A grade of "C" or better in CHEM 162 or consent of instructor.
Program: Chemistry
Student Learning Outcomes:

- Discuss the bonding and structure of organic compounds.
- Name various organic compounds using IUPAC rules and diagram their structures.
- Use stereochemical concepts in understanding physical and chemical properties.
- Identify chemical structure and physical chemical properties.
- Explain the relationship between structure and physical chemical properties.
- Predict reaction products, deduce starting materials and diagram reaction mechanism.
- Cite applications and important role of organic reactions in biology.

CHEM 273: Organic Chemistry II

This is the second semester course in organic chemistry intended or science majors. Topics to be covered include structure, properties, nomenclature, reactions, reaction mechanisms, stereochemistry and spectroscopy of conjugated systems, aromatic compounds, aldehydes, ketones, carboxylic acids and their derivatives, enols, enolates and their applications to biology.
Credits: 3
Lecture Hours: 3
Prerequisites:
A grade of "C" or better in CHEM 272 or consent of instructor.
Program: Chemistry
Student Learning Outcomes:

- Discuss the bonding and structure of organic compounds.
- Name various organic compounds using the IUPAC rules and diagram their structures.
- Use stereochemical concepts in understanding physical and chemical properties of organic compounds.
- Identify chemical structure based on spectroscopic data.
- Explain the relationship between structure and physical and chemical properties of organic compounds.
- Predict reaction products, deduce starting materials and diagram reaction mechanisms.
- Cite applications and the important role of organic reactions in biology.

EE 211: Basic Circuit Analysis I

This is an introductory course covering linear passive circuits, time domain analysis, transient and steady state responses, phasors, impedance and admittance, power and energy, frequency responses, and resonance.

Credits: 4
Lecture Hours: 3
Prerequisites:
Credit for or registration in MATH 243 (formerly MATH 231) or higher, credit for or registration in PHYS 272, or consent of instructor.
Program: Electrical Engineering
Student Learning Outcomes:

- Analyze and assemble basic circuits.
- Describe and analyze the basic functionality of the components of a basic circuit.
- Describe the rudiments of electric power production.

GEOG 101: The Natural Environment

Survey of the natural environment; distribution and interrelationships of climates, vegetation, soil, and land forms.
Credits: 3
Lecture Hours: 3
Program: Geography
Student Learning Outcomes:

- Describe the components (inputs), processes (actions) and resulting spatial patterns (outputs) of the physical environment (atmosphere, hydrosphere, lithosphere and biosphere) as a system.
- Apply the scientific method, and theories and concepts of geography to explain a physical environment.
- Explain critically the interaction of humans and the physical environment.
- Illustrate how his/her views of the physical environment have (or have not) changed.

GG 101: Introduction to Geology

The natural physical environment; the landscape; rocks and minerals, rivers and oceans; volcanism, earthquakes and other processes inside the Earth; effects of human use on the Earth and its resources. Field trip.
Credits: 3
Lecture Hours: 3
Program: Geology and Geophysics
Student Learning Outcomes:

- Explain the relevance of geology and geophysics to human needs, including those appropriate to Hawai'i, and be able to discuss issues related to geology and its impact on society and planet Earth.
- Apply technical knowledge of relevant computer applications, laboratory methods, and field methods to solve real-world problems in geology and geophysics.
- Use the scientific method to define, critically analyze, and solve a problem in earth science.
- Reconstruct, clearly and ethically, geological knowledge in both oral presentations and written reports.
- Evaluate, interpret, and summarize the basic principles of geology and geophysics, including the fundamental tenets of the sub-disciplines, and their context in relationship to other core sciences, to explain complex phenomena in geology and geophysics.

GG 103: Geology of Hawaiian Islands

Hawaiian geology and geologic processes: origin of Hawaiian Islands, volcanism, rocks and minerals, land forms, stream and coastal processes, landslides, earthquakes and tsunamis, ground water, geologic and environmental hazards. Field trips arranged.
Credits: 3
Lecture Hours: 3
Program: Geology and Geophysics
Student Learning Outcomes:

- explain the relevance of geology and geophysics to human needs, including those appropriate to Hawaii, and be able to discuss issues related to geology and its impact on society and planet Earth.
- Apply technical knowledge of relevant computer applications, laboratory methods, and field methods to solve real-world problems in geology and geophysics.
- Use the scientific method to define, critically analyze, and solve a problem in earth science.
- Reconstruct, clearly and ethically, geological knowledge in both oral presentations and written reports.
- Evaluate, interpret, and summarize the basic principles of geology and geophysics, including the fundamental tenets of the sub-disciplines, and their context in relationship to other core sciences, to explain complex phenomena in geology and geophysics.

OCN 120: Global Environmental Challenges

Scientific approach to evaluating human-caused environmental challenges and their potential solutions.
Credits: 3
Lecture Hours: 3
Program: Oceanography
Recommended:
Basic pre-college level math, chemistry, physics.
Student Learning Outcomes:

- Apply scientific principles and methods to describe natural Earth system interactions and human impacts on the environment.
- Solve very basic problems involving chemistry and physics, and read and create graphs of data.
- Apply scientific principles and methods to compare causes of environmental problems and impacts of potential solutions to environmental challenges.
- Apply scientific principles and reasoning to critically evaluate proposed explanations for global environmental challenges.

OCN 201: Science of the Sea

An introductory course to oceanography covering the dimensions of the science of oceanography, the physical and chemical properties of sea water, waves, tides, currents, life in the ocean, and the geologic structure of the ocean floor, environmental concerns, and human use of the oceans.
Credits: 3
Lecture Hours: 3
Program: Oceanography
Student Learning Outcomes:

- Understand how the scientific method works, how it has been applied in Earth science, and how it differs from other ways of acquiring knowledge.
- Articulate how the Earth is in integrative system across many scientific disciplines.
- Understand the internal structure of the Earth and the dynamic processes of plate tectonics that shape its surface, including seafloor spreading, subduction, and continental drift.
- Understand the causes of rising sea level and its impacts on coastal areas, including erosion and beach loss.
- Identify the major pathways of chemicals to the oceans and the effect that biological processes have on redistributing and removing chemicals from the oceans.
- Describe the major processes that cause the deep and shallow circulation of water in the oceans.
- Identify the major marine habitats, the types of organisms that live in those habitats, and give examples of how organisms are adapted to their habitat.
- Describe the types of interactions that occur among organisms in the marine food web and between organisms and their environment.

PHYS 122: Introduction to Science: Physical

Characteristics of science, historical development of scientific concepts, and interactions with society illustrated by topics from physical sciences, with emphasis in physics and chemistry. Designed for non-science majors.
Credits: 3
Lecture Hours: 3
Prerequisites:
Credit in Math 25, 26, 28, 29, 75X or higher or equivalent.
Co-Requisites:
PHYS 122L.
Program: Physics
Student Learning Outcomes:

- Recognize the fundamental principles and philosophy upon which the scientific method is based.
- Apply the basic concepts of physics and chemistry.
- Apply the concept of conservation laws in problem solving.
- Apply basic mathematics to problems in physics and chemistry.
- Define the common terms used in the physical sciences.
- Assess the limitations of the scientific method and apply error analysis.
- Recognize the physical science principles as applied to everyday situations.

PHYS 151: College Physics I

A noncalculus one semester course for preprofessionaI or nonengineering majors. Study of the basic concepts of physics, including the fundamental principles and theories in mechanics, energy, and waves.
Credits: 3
Lecture Hours: 3
Prerequisites:
Credit for or registration in MATH 140 or higher, or consent of instructor
Co-Requisites:
PHYS 151L.
Program: Physics
Student Learning Outcomes:

- Demonstrate a general understanding of the underlying philosophy of the physics, including the scientific method.
- Apply the basic concepts of physics, including mechanics, energy, simple oscillatory systems, gas laws and fluid dynamics.
- Apply the concept of conservation laws in problem solving.
- Apply basic algebraic and graphical analysis techniques to physics problems.
- Compare and contrast macroscopic and microscopic systems in physics.
- Define quantitatively and qualitatively the common terms used in physics.
- Assess the limitations of the scientific method and apply error analysis.
- Determine when to apply physics principles to everyday situations.

PHYS 152: College Physics II

A noncalculus, one-semester course for pre-professional or nonengineering majors. Study of the basic concepts of physics, including the fundamental principles and theories in electricity, magnetism, optics, and modern physics.
Credits: 3
Lecture Hours: 3
Prerequisites:
Credit for PHYS 151 or equivalent, or consent of instructor.
Co-Requisites:
PHYS 152L.
Program: Physics
Student Learning Outcomes:

- Demonstrate a general understanding of the underlying philosophy of the physics, including the scientific method.
- Apply the basic concepts of physics, including thermodynamics, static and dynamic laws of electricity and magnetism, circuit analysis, electromagnetic radiation, optical systems, and the fundamentals of atomic and nuclear physics.
- Apply the concept of conservation laws in problem solving.
- Apply basic algebraic and graphical analysis techniques to physics problems.
- Compare and contrast macroscopic and microscopic systems in physics.
- Define quantitatively and qualitatively the common terms used in physics.
- Assess the limitations of the scientific method and apply error analysis.
- Recognize the physical science principles as applied to everyday situations.

PHYS 170: General Physics I

This is the first of a rigorous, calculus-based course in physics for the professional or engineering majors. The study of the concepts of physics including the fundamental principles and theories of mechanics, energy, waves and thermodynamics.
Credits: 4
Lecture Hours: 4
Prerequisites:
Credit for MATH 241 (formerly MATH 205) or higher or equivalent or consent of instructor
Co-Requisites:
PHYS 170L and credit for or registration in MATH 242 (formerly MATH 206) or equivalent, or consent of instructor.
Program: Physics
Student Learning Outcomes:

- Demonstrate a solid conceptual understanding of kinematics, dynamics, wave phenomena, and thermodynamics.
- Solve applicable problems using differential calculus and vector analysis.
- Apply the laws of physics to computational problems in kinematics, dynamics, wave phenomena, and thermodynamics.

PHYS 272: General Physics II

This is the second in a rigorous, calculus-based physics course for the professional or engineering major. The study of the concepts of physics including the fundamental principles and theories of electricity, magnetism, light, and optical theory.
Credits: 3
Lecture Hours: 3
Prerequisites:
Credit for MATH 242 (formerly MATH 206) or higher or equivalent and a grade of "C" or better in PHYS 170 or consent of instructor
Co-Requisites:
PHYS 272L.
Program: Physics
Student Learning Outcomes:

- Demonstrate a solid conceptual understanding of electricity, magnetism, light, and optical theory.
- Solve applicable problems using calculus and vector analysis.
- Apply the laws of physics to computational problems in electricity, magnetism, and wave phenomena.

PHYS 274: General Physics III

This course focuses on the study of physical optics, special relativity, quantum mechanics, solid state physics, atomic and nuclear physics, and elementary particle physics.
Credits: 3
Lecture Hours: 3

Prerequisites:
Credit for PHYS 272 and PHYS 272L, and credit for or registration in MATH 243 (formerly MATH 231), or consent of instructor.
Program: Physics
Student Learning Outcomes:
- Describe the theory of special relativity and its effects: time dilation and space contraction.
- Describe the particle like properties of electromagnetic radiation as demonstrated in the photoelectric effect and Compton scattering.
- Analyze the wavelike properties of matter known as quantum theory.
- Identify and Describe knowledge of the different properties of solids such as crystal structure, thermal and magnetic properties, and superconductivity.
- Describe nuclear structure, radioactive decay, nuclear interactions, and their applications.
- Identify the different elementary particles and describe their role in the forces that hold matter together.

SCI 210: Polynesian Voyaging: Seamanship and Stewardship

This course focuses on the fundamentals of oceanic voyaging by blending the traditions of Polynesian culture, history and skills with modern science and technology. An interdisciplinary approach is used in treating topics in astronomy, navigation, geology, oceanography, meteorology and archaeology. Students are introduced to the basic skills of seamanship and stewardship, including the techniques in navigational wayfinding and the impact of human activity on the island environments.

Credits: 3
Lecture Hours: 3
Program: Science
Recommended:
Credit for or concurrent enrollment in HSWT 110
Student Learning Outcomes:
- Describe the basic geography of Polynesia and its settlement as gleaned from archaeological findings.
- Apply the fundamental concepts in modern positional astronomy and techniques of wayfinding (non-instrument navigation).
- Discuss Polynesian mythology and cosmology, especially as related to voyaging.
- Apply the basic concepts in geology and weather forecasting in the Pacific area.

Natural Sciences (DY)

AG 202L: Agriculture, Environment, and Society Laboratory

The goal of this course is to establish foundational knowledge of agroecosystems. Emphasis is on the interrelationship among the crop plants, essential plant nutrients, social factors, and cultural practices. Key goals are to introduce students to the broad range of topics covered within agroecosystems, as well as field and laboratory investigations in agroecology.

Credits: 1
Lab Hours: 3
Prerequisites:
Grade of C or better or concurrent enrollment in AG 202.
Program: Agriculture
Recommended:
Grade of C or better in ENG 100.
Student Learning Outcomes:
- Use the scientific method of inquiry to investigate ecological concepts and principles in an agricultural setting.
- Prepare written objective reports describing and interpreting experimental and observational results.
- Conduct experiments that evaluate the application of ecological concepts and principles to the design and management of sustainable food systems.

ANSC 142L: Anatomy of Domestic Animals Laboratory

Laboratory to accompany ANSC 142. This course is designed to acquaint the student with the body systems of common domestic species (e.g., cats, dogs, horses and birds) through dissections, examinations of models, laboratory exercises, and other hands-on activities. This course is intended for students entering veterinary technology, veterinary assisting or other animal-related fields.
Credits: 1

Prerequisites:
Registration in or a grade "C" or better in ANSC 140 and ANSC 142. Credit for or placement in ENG 100 and MATH 101. Confirmed attendance to Windward CC veterinary technology information session.
Program: Animal Sciences
Student Learning Outcomes:

- Identify and describe the anatomy of the major body systems for cats, dogs and horses using prepared slides, skeletons, models and dissections.
- Use standard anatomical terms to describe body directions, regions and sectioning planes.
- Identify major anatomical landmarks used to assess patient health during physical exams.
- Demonstrate proficiency at the use of the microscope as a clinical instrument.

ANSC 151L: Clinical Laboratory Techniques Lab

Laboratory to accompany ANSC 151. Provides students with the knowledge and skills necessary to perform common veterinary lab tests including urinalysis, hematology, blood chemistry, cytology and parasitology. This course is intended for students entering veterinary technology, veterinary assisting or other animal-related fields.
Credits: 1
Prerequisites:
A grade of "C" or better in ANSC 142 and ANSC 142L.
Program: Animal Sciences
Student Learning Outcomes:

- Properly package, handle and store specimens for laboratory analysis.
- Demonstrate proficiency in the use of veterinary lab equipment (e.g. microscopes, blood chemistry analyzers, centrifuges, and refractometers).
- Determine proper maintenance and quality control procedures necessary to ensure accurate results.
- Properly carry out analysis of laboratory specimens, including urinalysis, CBC, blood chemistry and common cytological and parasitological procedures.
- Use critical thinking to analyze and interpret clinical data to determine if a need exists for additional laboratory tests that will provide useful diagnostic information.

ANSC 261L: Anesthesiology and Veterinary Dentistry for Veterinary Technicians Lab

This course will focus on the clinical skills necessary for safe and effective anesthesia and dental prophylaxis of companion animal patients (dogs and cats). Skills such as intravenous catheter placement, endotracheal intubation, patient preparation and monitoring, and dental prophylaxis under general anesthesia will be stressed. The use and side effects of commonly used sedatives, analgesics and anesthetics will be covered. Postoperative procedures include patient monitoring and charting as well as client education for postoperative care.
Credits: 2
Prerequisites:
Admission in the Veterinary Technology Program and a grade of "C" or better in all completed ANSC courses
Co-Requisites:
Co-registration in ANSC 261.
Program: Animal Sciences
Student Learning Outcomes:

- Safely and effectively manage patients during all phases of anesthetic procedures.
- Safely and effectively select, operate and maintain anesthetic delivery equipment and monitoring instruments.
- Safely and effectively operate and maintain dental equipment.
- Understand and integrate all aspects of patient management for common dental procedures in companion animal species.
- Identify and provide appropriate instruments, supplies and environment to maintain asepsis during dental procedures.

ANSC 262L: Clinical Procedures for Large Animals Lab

The student will learn techniques in large animal restraint, husbandry and clinical procedures and be provided some introduction to Relevant large animal diseases. Biosecurity and public health will be discussed as they apply to large animal health care and husbandry. The course is appropriate for those entering animal husbandry, veterinary assisting, veterinary technology or animal science fields.
Credits: 1
Prerequisites:
Admission in the Veterinary Technology Program and a grade of "C" or better in all completed ANSC courses
Co-Requisites:
ANSC 262
Program: Animal Sciences

Student Learning Outcomes:

- Safely and successfully restrain various species of livestock for medical examination and procedures.
- Medicate, bandage, groom, and feed large animals.
- Successfully perform diagnostic sampling and imaging tasks on large animals.

ANSC 271L: Anesthesiology and Surgical Nursing for Veterinary Technicians Lab

This course will focus on the clinical skills necessary for safe and effective anesthesia and surgery of companion animal patients (dogs and cats). Skills such as intravenous catheter placement, proper endotracheal intubation, patient and surgical site preparation, and patient monitoring under general anesthesia will be stressed. The use and side effects of commonly used sedatives, analgesics and anesthetics will be covered. Postoperative procedures include patient monitoring and charting as well as client education for postoperative care.
Credits: 2
Prerequisites:
Admission in the Veterinary Technology Program and a grade of "C" or better in all completed ANSC courses
Co-Requisites:
Co-registration in ANSC 271.
Program: Animal Sciences
Student Learning Outcomes:

- Safely and effectively manage patients during all phases of anesthetic procedures.
- Safely and effectively select, operate and maintain anesthetic delivery equipment and monitoring instruments.
- Understand and integrate all aspects of patient management for common surgical procedures in companion animal species.
- Identify and provide appropriate instruments, supplies and environment to maintain asepsis during surgical procedures.

AQUA 106L: Small Scale Aquaculture Laboratory

Companion laboratory to AQUA 106, Small Scale Aquaculture. Practical, hands-on experiences in small scale aquaculture. Laboratory/field trip class.
Credits: 1
Prerequisites:
Credit for or registration in AQUA 106.
Program: Aquaculture
Student Learning Outcomes:

- Construct and operate different kinds of small-scale aquaculture systems.
- Identify and classify common species of aquaculture organisms.
- Identify anatomical (internal and external) features of aquaculture organisms.
- Operate a small-scale aquaculture system to successful harvest of target species.
- Monitor culture conditions (physical, chemical and biological) in small-scale aquaculture systems.
- Demonstrate techniques for the cultivation of live food cultivation.
- Demonstrate techniques for the reproduction of aquaculture species.

AQUA 201L: The Hawai'i Fishpond Lab

An introduction into the history, development, biology and ecology, management, restoration, and future of Hawaiian fishponds. This course will study traditional Hawaiian fishponds, merging traditional knowledge with the principles of modern Western science.
Credits: 1
Prerequisites:
Credit for or registration in AQUA 201 or consent of instructor.
Program: Aquaculture
Student Learning Outcomes:

- Use the scientific method of inquiry to study a Hawaiian fishpond.
- Apply the concepts learned in AQUA 201 to an experimental and hands-on observational setting.
- Use analytical tools and instruments to study the oceanography, biology and ecology of Hawaiian fishponds.
- Collect, reduce, and interpret data.
- Prepare written objective reports describing and interpreting experimental and observational results.
- Identify and classify common fishpond species.
- Design a Hawaiian fishpond.
- Manage all aspects of a Hawaiian fishpond.

ASTR 110L: Survey of Astronomy Lab

Demonstration of astronomical principles through laboratory observations and analysis of astronomical data. Not required for ASTR 110.

Credits: 1
Prerequisites:
Credit for or registration in ASTR 110 or consent of instructor.
Program: Astronomy
Student Learning Outcomes:

- Apply the scientific method to a selected group of topics in astronomy.
- Collect, report and analyze data obtained in a laboratory and/ or observatory setting in a manner exhibiting organization, proper documentation and critical thinking.
- Demonstrate a basic understanding of the use of standard astronomical instruments.
- Perform image analysis, especially as related to astronomical photographic data.
- Identify environmental factors, which affect the outcome of an experiment or observation and apply basic error analyses techniques.
- Demonstrate a working knowledge of computer on-line and Internet astronomical programs.

ASTR 250L: Observational Astronomy Lab

A lab course in modern observational astronomy, with emphasis on "hands-on" use of instruments to acquire data with research-grade telescopes at the college's Lanihuli Observatory. Remote telescope observations may also be used. Students will gain on-site observing experience with CCD photometry and spectroscopy through direct acquisition and data analysis using modern laboratory data reduction software. Applications to planetary, solar, stellar and, where possible, galactic astrophysics will be covered.
Credits: 1
Prerequisites:
credit or current enrollment in ASTR 250
Program: Astronomy
Recommended:
Student should have operational familiarity with high school algebra and basic trigonometry.
Student Learning Outcomes:

- Use appropriate celestial charts and astronomical time system to identify and locate celestial objects, such as stars, nebulae, galaxies, planets, satellites and asteroids.
- Describe the fundamentals optics and telescopic observations.
- Operate and make observations with optical, radio and cosmic ray telescopes.
- Apply basic principals in planetary remote sensing and image processing using both real-time observations and archived data.
- Apply the techniques of astrophotography and spectrometry.
- Use appropriate techniques to analyze astronomical data.

BIOL 100L: Human Biology Laboratory

LaboratorytoaccompanyBIOL100 (Human Biology). Emphasizes the application of the scientific method, basic laboratory methods and procedures in biology, and facts and principles of human anatomy and physiology.
Credits: 1
Prerequisites:
Credit for or registration in BIOL 100 or equivalent preparation or consent of instructor.
Program: Biology
Student Learning Outcomes:

- Use the scientific method of inquiry to investigate biological phenomena.
- Apply the concepts learned in BIOL 100 to an experimental and hands-on observational setting.
- Collect, reduce, and interpret biological data.
- Prepare written objective reports describing and interpreting experimental and observational results.
- Demonstrate the use of some of the standard tools of the biological scientist, such as microscopes, scales, spectrophotometers, computers, and other analytical tools.
- Apply the standard analytical procedures needed to study human biology, such as dissection, separation of biological compounds, microscopic examination of cells and tissues, membrane transport mechanisms, energy metabolism, genetics, digestion and nutrition, excretion, skeletal muscle physiology, cardiovascular function, nervous system function, respiration, and blood analyses.
- Recognize and identify basic human tissue types and their distinguishing characteristics.
- Demonstrate basic knowledge of anatomy (structure) and physiology (function) of the fetal pig (using preserved specimens) and human body (using models and figures).

BIOL 101: Biology and Society

Historical development of scientific concepts, characteristics, and interaction of science and society from the perspective of biological sciences.

Credits: 4
Lecture Hours: 3

Prerequisites:
Credit in MATH 25, 26, 29, 82 or higher or equivalent preparation; and placement in ENG 100, or consent of instructor.
Program: Biology
Student Learning Outcomes:

- Distinguish science as a way of knowing from other epistemological systems.
- Discuss the historical development of the discipline of biology into what it is today, relating the contributions made by significant individuals and concepts of the past to modern biology.
- Explain the major integrating principles of biology.
- Explain the origin and organization of the diversity of life on Earth.
- Describe how living systems function, relating structure to function, at all levels within the hierarchy of life from molecules to the biosphere.
- Solve problems in inheritance and genetics.
- Present informed, rational and objective opinions on biologically-related issues important to human society.
- Use the scientific method of inquiry to investigate biological phenomena.
- Apply the concepts learned to an experimental and hands-on observational setting.
- Collect, reduce, and interpret biological data.
- Prepare written objective reports describing and interpreting experimental and observational results.
- Demonstrate the use of some of the standard tools and methods of the biological scientist, such as microscopes, scales, spectrophotometers, computers, dissection dichotomous keys, and other analytical tools.
- Identify the major systematic groups to which specimens of living things belong.

BIOL 124L: Environment and Ecology Lab

Companion laboratory class to BIOL 124, Environment and Ecology. This class, providing hands-on experience in the laboratory and in the field, enhances the student's understanding of basic environmental science and ecological concepts presented in BIOL 124.
Credits: 1
Prerequisites:
Credit for or registration in BIOL 124 or consent of instructor.
Program: Biology
Student Learning Outcomes:

- Use the scientific method of inquiry to investigate environmental phenomena.
- Apply the concepts learned in BIOL 124 to an experimental and hands-on observational setting.
- Collect, reduce, and interpret biological data.
- Prepare written objective reports describing and interpreting experimental and observational results.
- Demonstrate the use of some of the standard tools of the environmental scientist, such as microscopes, scales, spectrophotometers, various environmental meters, and basic statistical procedures.
- Apply the standard analytical procedures needed to study the environment, such as soil analyses, water quality determinations, stream bioassessments, and quantitative resource inventories.
- Conduct experiments that evaluate how environmental factors affect living organisms.

BIOL 171L: Introduction to Biology I Lab

Laboratory to accompany BIOL 171.
Credits: 1
Prerequisites:
Credit for or registration in BIOL 171
Program: Biology
Recommended:
High school chemistry or college chemistry.
Student Learning Outcomes:

- Use the scientific method of inquiry to investigate biological phenomena.
- Apply the concepts learned in BIOL 171 to an experimental and hands-on observational setting.
- Collect, reduce, and interpret biological data.
- Prepare written objective reports describing and interpreting experimental and observational results.
- Demonstrate the use of some of the standard tools of the biological scientist, such as microscopes, scales, spectrophotometers, computers, and other analytical tools.
- Apply the standard analytical procedures of biology, such as chromatography, biochemical analyses, preparation of materials for microscopic examination, culture techniques, and statistical procedures (descriptive statistics and hypothesis testing).

BIOL 172L: Introduction to Biology II Lab

Laboratory to accompany BIOL 172.
Credits: 1

Co-Requisites:
BIOL 172.
Program: Biology
Recommended:
High school biology and college level reading and writing skills.
Student Learning Outcomes:

- Use the scientific method of inquiry to investigate biological phenomena.
- Apply the concepts learned in BIOL 172 to an experimental and hands-on observational setting.
- Collect, reduce, and interpret biological data.
- Prepare written objective reports describing and interpreting experimental and observational results.
- Apply standard analytical procedures for the comparative study of plants and animals, such as the handling of living and preserved materials for study, dissection procedures, preparation of materials for microscopic examination, and use of dichotomous keys.
- Identify the diagnostic anatomical features of organisms representing major groups of plants and animals.
- Identify the major systematic groups to which specimens of plants and animals belong.

BIOL 200L: Coral Reef Laboratory and Field Studies

Laboratory and field studies of the biology, ecology, and geology of stony corals and the reef structures they build; companion course to BIOL 200.
Credits: 1
Prerequisites:
Credit for or registration in BIOL 200 or consent of instructor
Program: Biology
Recommended:
High school biology and algebra.
Student Learning Outcomes:

- Use the scientific method of inquiry to investigate biological phenomena.
- Apply the concepts learned in BIOL 200 to an experimental and hands-on observational setting.
- Collect, reduce, and interpret biological data.
- Prepare written objective reports describing and interpreting experimental and observational results.
- Demonstrate the use of some of the standard tools of the biological scientist, such as microscopes, scales, spectrophotometers, computers, and other analytical tools.
- Demonstrate the use of specialized tools and methods frequently used in the study of corals and coral reefs.

BIOL 265L: Ecology and Evolutionary Biology Lab

Laboratory to accompany BIOL 265.
Credits: 1
Co-Requisites:
BIOL 265; or consent of the instructor.
Program: Biology
Recommended:
ICS 101 or ICS 105B-E; or familiarity with spreadsheets, word processing, and Internet browsers.
Student Learning Outcomes:

- Use the scientific method of inquiry to investigate ecological and evolutionary phenomena.
- Apply the concepts learned in BIOL 265 to an experimental and hands-on observational setting.
- Apply standard analytical procedures for the study of evolution and ecology. These include the following areas of study: experimental design and set-up; descriptive statistics and hypothesis testing; age structure of a natural population; sampling and describing population attributes; sampling, describing, and quantifying the flora, fauna, and relevant abiotic characteristics of a terrestrial habitat; plant competition; optimal foraging theory; sampling and describing community characteristics and functions; primary productivity; natural selection; colonization and adaptive radiation of Hawaiian flora and fauna; taxonomy, systematics, and phylogenetics.
- Collect, reduce, and interpret ecological and evolutionary data.
- Prepare written objective reports describing and interpreting experimental and observational results.

BIOL 275L: Cell and Molecular Biology Lab

Laboratory for cell and molecular biology.
Credits: 1
Co-Requisites:
BIOL 275; or consent of the instructor.
Program: Biology
Recommended:
ICS 101 or ICS 105B-E, calculus or algebra.

Student Learning Outcomes:
- Operate equipment used in cell and molecular biology laboratory.
- Conduct experiments including DNA/RNA/protein extraction and electrophoresis, enzyme kinetics, ELISA, RFLP, PCR, gene expression.
- Produce lab reports using the standard scientific format.

BOT 101L: General Botany Lab

Lab observations and experiments illustrating basic principles of plant biology.
Credits: 1
Prerequisites:
Credit for or registration in BOT 101.
Program: Botany
Recommended:
High School Biology DY
Student Learning Outcomes:
- Operate dissecting and compound microscopes.
- Cultivate and maintain the growth of plants.

BOT 130L: Plants in the Hawaiian Environment Lab

BOT 130L focuses on observations of Native Hawaiian plant species, populations and communities as they interact in the natural environment and studies the unique characteristics of the plants through lab observations.
Credits: 1
Prerequisites:
Credit for or registration in BOT 130
Program: Botany
Student Learning Outcomes:
- Mastering botanical terminology for use in identifying Native Hawaiian plants
- Analyzing the environmental factors that affect the plant dispersal and establishment, adaptation and diversification.

BOT 205: Ethnobotanical Pharmacognosy

A study of medicinal plants of Hawai'i, their characteristics, plant extraction, isolation and identification of their chemical constituents for possible uses in pharmaceuticals or in their natural state, and bioproduct manufacturing. This course is designed to train students for careers in plant and medical biotechnology. Lecture and laboratory/fieldtrip course.

Credits: 4
Lecture Hours: 3
Prerequisites:
Credit for or registration in any of these courses: BOT 101, BOT 105, BOT 130, MICR 130, MICR 140, BIOL 172/172L, CHEM 152/152L or consent of instructor.
Program: Botany
Recommended:
High school biology, chemistry and math.
Student Learning Outcomes:
- Discuss theories and principles in the study of medicinal and nutritious plants.
- Discuss ethics, intellectual property rights and conservation of traditional knowledge.
- Perform Laboratory activities: plant extraction, distillation, bioassay tests, analysis of chemical constituents for possible uses in pharmaceuticals and nutraceutical products.
- Produce lab reports using the standard scientific format.

BOT 210: Phytobiotechnology

Introduction to practical aspects of Plant Biotechnology. Topics include micropropagation techniques, such as plant tissue, cell and protoplast cultures: DNA-based technologies, such as DNA extraction, DNA sequencing, PCR; and methods of plant genetic engineering. This course is designed to train students for careers in advanced agriculture technology and industry.

Credits: 4
Lecture Hours: 3
Prerequisites:
Credit for or registration in BOT 101, or AG 152, or MICR 130 and MICR 140, or BIOL 171 and 171L. Placement into MATH 100 or higher.
Program: Botany

Recommended:
High school biology or chemistry, MATH 24.
Student Learning Outcomes:
- Apply the principles of genetics.
- Discuss and perform experiments including plant/bacterial/ human DNA/protein electrophoresis, Southern and Western blots, plant genetic engineering using biolistic bombardment and bacterial gene transformation.
- Apply bioinformatics and DNA sequencing.
- Discuss bioethical issues, risks and benefits of biotechnology.
- Produce lab reports using the standard scientific format.

CHEM 100L: Chemistry and Society Lab

Experiments in everyday chemistry.
Credits: 1
Prerequisites:
Credit for or registration in CHEM 100.
Program: Chemistry
Student Learning Outcomes:
- Identify/locate laboratory safety equipment and apply laboratory safety procedures.
- Construct molecular models to determine molecular shape and properties.
- Assemble apparatus to perform common laboratory techniques to verify fundamental chemistry principles in everyday life.
- Make and record accurate observations and precise quantitative measurements.
- Synthesize conclusions based on observations and data in a formal laboratory report.
- Identify sources of error in laboratory experiments.

CHEM 151L: Elementary Survey of Chemistry Lab

Experiments introducing laboratory techniques and illustrating chemical principles; supplemented by films, demonstrations, and problem sessions.
Credits: 1
Prerequisites:
Credit for or registration in CHEM 151.
Program: Chemistry
Student Learning Outcomes:
- Identify and locate laboratory safety equipment and apply laboratory safety procedures.
- Assemble apparatus to perform common laboratory techniques to verify basic chemistry laws on gases, chemical stoichiometry, chemical equilibrium and others.
- Use molecular models and technology to investigate chemistry concepts.
- Make and record accurate observations, precise measurements and calculations applying rules on significant figures.
- Develop hypotheses, use critical thinking to process results and identify sources of error.
- Apply and articulate the scientific method by preparing a lab report using the standard scientific format.

CHEM 161L: General Chemistry I Lab

Laboratory experiments illustrating fundamental principles of chemistry.
Credits: 1
Prerequisites:
Credit for or registration in CHEM 161.
Program: Chemistry
Student Learning Outcomes:
- Apply laboratory safety procedures and respond to hazards.
- Use molecular and crystal models, perform common laboratory techniques competently and computer-based experiments to verify chemistry laws on stoichiometry, thermochemistry, behavior of gases and liquids.
- Apply and articulate the scientific method by preparing lab reports using the standard scientific format. Express in writing core chemistry principles, results of experiments and do critical thinking by synthesizing conclusions based on observations and data.
- Make and record precise measurements, calculate results using significant figures, standard deviations and identify sources of error in laboratory experiments.
- Use computer competently, word-processing, spreadsheet and graphing.
- Prepare chemical solutions, perform dilutions, calculate solution concentrations and generate a calibration curve.

CHEM 162L: General Chemistry II Lab

Laboratory experiments illustrating fundamental principles of chemistry.

Credits: 1
Prerequisites:
Credit for or registration in CHEM 162.
Program: Chemistry
Student Learning Outcomes:

- Develop an appreciation for the methods of scientific inquiry through computer-based laboratory experiments showing real-time data.
- Apply knowledge to determine molar mass of unknown substance using freezing point depression data of solution.
- Calculate chemical reaction rate and constant using graphing analysis.
- Predict the effects of concentration and temperature changes on equilibrium mixtures using Le Chatelier's principle.
- Determine whether equilibrium is established and calculate equilibrium concentrations/constants and cell potentials.
- Apply and articulate the scientific method by preparing lab reports using the standard scientific format. Express in writing core chemistry principles, results of experiments and do critical thinking by synthesizing conclusions based on observations and data.

CHEM 272L: Organic Chemistry I Lab

Laboratory principles of Organic Chemistry I, the first semester course in organic chemistry intended for science majors. Topics to be covered include structure, properties, nomenclature, reactions, reaction mechanisms, stereochemistry and spectroscopy of alkanes, alkenes, alkynes, alkyl halides, alcohols and their applications to biology.
Credits: 2
Prerequisites:
A grade of "C" or better or registration in CHEM 272 or consent of instructor.
Program: Chemistry
Student Learning Outcomes:

- Perform and develop skills in organic chemistry laboratory methods and techniques used in separation and purification.
- Determine the chemical identity of some organic chemicals through their properties.
- Keep complete and accurate records, manipulate data for mathematical calculations, including reactant recovery and percent yield.
- Apply laboratory safety and safety disposal of waste procedures that can be used in all future laboratory experiences.
- Gain experience in conducting synthesis and functional group conversion.
- Interpret experimental data and formulate conclusions as evidenced in laboratory reports.

CHEM 273L: Organic Chemistry II Lab

Laboratory principles of Organic Chemistry II, the second semester course in organic chemistry intended for science majors. Topics to be covered include techniques, synthesis, qualitative organic analysis and applications of spectroscopy.
Credits: 1
Prerequisites:
A grade of "C" or better in CHEM 272L and a grade of "C" or better or registration in CHEM 273 or consent of instructor.
Program: Chemistry
Student Learning Outcomes:

- Perform and develop skills in organic chemistry laboratory methods and techniques used in separation and purification.
- Determine the chemical identity of some organic chemicals through their properties.
- Keep complete and accurate records, manipulate data for mathematical calculations, including reactant recovery and percent yield.
- Apply laboratory safety procedures, including safe disposal of waste.
- Gain experience in organic synthesis and functional group conversion.
- Interpret experimental data and formulate conclusions as evidenced in laboratory reports.

EE 211: Basic Circuit Analysis I

This is an introductory course covering linear passive circuits, time domain analysis, transient and steady state responses, phasors, impedance and admittance, power and energy, frequency responses, and resonance.

Credits: 4
Lecture Hours: 3
Prerequisites:
Credit for or registration in MATH 243 (formerly MATH 231) or higher, credit for or registration in PHYS 272, or consent of instructor.
Program: Electrical Engineering
Student Learning Outcomes:

- Analyze and assemble basic circuits.
- Describe and analyze the basic functionality of the components of a basic circuit.
- Describe the rudiments of electric power production.

GEOG 101L: The Natural Environment Laboratory

Analysis by use of maps, air photos, field and laboratory observation, and experimentation. Emphasis on Hawai'i and on human modification of environment. Required field trips during regular class hours.
Credits: 1
Prerequisites:
Credit for or registration in GEOG 101.
Program: Geography
Student Learning Outcomes:

- Apply the scientific method to study a physical environment: Define a problem for a study, gather and record data, analyze the data, arrive at appropriate conclusions, and report the findings in written form.
- Use various instruments, such as a compass, GPS unit and thermometer, to gather environmental data.
- Use the metric system, scientific notation, graphs, and geographic and basic statistical measurements.
- Write a lab report using the standard scientific format.

GG 101L: Introduction to Geology Lab

Hands-on study of minerals, rocks, and topographic maps. Examine volcanism, hydrology, coastal processes and hazards, geologic time and earthquakes. Field trips to investigate landslides, beaches and O'ahu geology.
Credits: 1
Program: Geology and Geophysics
Student Learning Outcomes:

- Explain the relevance of geology and geophysics to human needs, including those appropriate to Hawai'i, and be able to discuss issues related to geology and its impact on society and planet Earth.
- Apply technical knowledge of relevant computer applications, laboratory methods, and field methods to solve real-world problems in geology and geophysics.
- Use the scientific method to define, critically analyze, and solve a problem in earth science.
- Reconstruct, clearly and ethically, geological knowledge in both oral presentations and written reports.
- Evaluate, interpret, and summarize the basic principles of geology and geophysics, including the fundamental tenets of the sub-disciplines, and their context in relationship to other core sciences, to explain complex phenomena in geology and geophysics.

GG 210: O'ahu Field Geology

Field trip and laboratory sessions relating to the Geology of O'ahu.
Credits: 1
Prerequisites:
Credit for or registration in GG 101, GG 103, or consent of instructor.
Program: Geology and Geophysics
Student Learning Outcomes:

- Understand through field observation, with field and laboratory exercises, geological processes that construct, modify, and destroy the Hawaiian landscape.
- Realize the hazards, mitigation of these hazards and benefits of Hawaiian volcanism, and its relationship to island culture (s).
- Appreciate current research and studies of Hawaiian volcanism through visits to appropriate museums and research laboratories.
- Understand the vastness of geological time applied to Hawai'i, and how time is measured thus the time-scale known.

GG 211: Big Island Field Geology

A four-day field trip on the island of Hawai'i. A survey of Hawaiian volcanic processes is illustrated by studying Kilauea, Mauna Kea, Mauna Loa, Hualalai, and Kohala volcanoes. Students are responsible for air and ground transportation, meals, and lodging.
Credits: 1
Prerequisites:
Credit for or registration in GG 101, GG 103, or consent of instructor. Must have medical clearance.
Program: Geology and Geophysics
Student Learning Outcomes:

- Understand through field observation, with field and laboratory exercises, geological processes that construct, modify, and destroy the Hawaiian landscape.
- Realize the hazards, mitigation of these hazards and benefits of Hawaiian volcanism, and its relationship to island culture (s).
- Appreciate current research and studies of Hawaiian volcanism through visits to appropriate museums and research laboratories.
- Understand the vastness of geological time applied to Hawai'i, and how time is measured thus the time-scale known.

GG 212: Maui Field Geology

A four-day field trip on the island of Maui. A survey of Hawaiian volcanology and geomorphology illustrated by field studies of Haleakala and West Maui volcanoes. Students are responsible for air and ground transportation, meals, and lodging.
Credits: 1
Prerequisites:
Credit for or registration in GG 101, GG 103, or consent of instructor. Must have medical clearance.
Program: Geology and Geophysics
Student Learning Outcomes:

- Understand through field observation, with field and laboratory exercises, geological processes that construct, modify, and destroy the Hawaiian landscape.
- Realize the hazards, mitigation of these hazards and benefits of Hawaiian volcanism, and its relationship to island culture (s).
- Appreciate current research and studies of Hawaiian volcanism through visits to appropriate museums and research laboratories.
- Understand the vastness of geological time applied to Hawai'i, and how time is measured thus the time-scale known.

GG 213: Moloka'i, Lana'i, and Kaho'olawe Field Geology

A four-day field trip on the islands of Moloka'i and Lana'i. Field studies of East Moloka'i, West Moloka'i, Makanalua (Kalaupapa) and Lana'I volcanoes, and directed reading on Kaho'olawe volcano. Students are responsible for air and ground transportation, meals, and lodging.
Credits: 1
Prerequisites:
Credit for or registration in GG 101, GG 103, or consent of instructor. Must have medical clearance.
Program: Geology and Geophysics
Student Learning Outcomes:

- Understand through field observation, with field and laboratory exercises, geological processes that construct, modify, and destroy the Hawaiian landscape.
- Realize the hazards, mitigation of these hazards and benefits of Hawaiian volcanism, and its relationship to island culture (s).
- Appreciate current research and studies of Hawaiian volcanism through visits to appropriate museums and research laboratories.
- Understand the vastness of geological time applied to Hawai'i, and how time is measured thus the time-scale known.

GG 214: Kaua'i and Ni'ihau Field Geology

A four-day fieldtrip on the island of Kaua'I to study the volcanological evolution and continuing geological history of Kaua'i and Ni'ihau volcanoes. Students are responsible for air and ground transportation, meals, and lodging.
Credits: 1
Prerequisites:
Credit for or registration in GG 101, GG 103, or consent of instructor.
Program: Geology and Geophysics
Student Learning Outcomes:

- Understand through field observation, with field and laboratory exercises, geological processes that construct, modify, and destroy the Hawaiian landscape.
- Realize the hazards, mitigation of these hazards and benefits of Hawaiian volcanism, and its relationship to island culture (s).
- Appreciate current research and studies of Hawaiian volcanism through visits to appropriate museums and research laboratories.
- Understand the vastness of geological time applied to Hawai'i, and how time is measured thus the time-scale known.

IS 201: The Ahupua'a

Study of the traditional Hawaiian approaches to natural resource development, utilization, exploitation, and management. The ahupua'a, as the traditional Hawaiian unit of land and sea subdivision, beginning in the upland forests, stretching across lower elevations, past the shoreline to the edge of the reef, will be evaluated as a microcosm of an integrated ecosystem and as a model for natural resource management and sustainability.

Credits: 3
Lecture Hours: 2
Program: Interdisciplinary Studies
Recommended:
BIOL 101 or BIOL 124 or similar preparation.

Student Learning Outcomes:

- Describe how the Hawai'i's unique geological formation affects its sustainable natural resources.
- Describe how the ancient migration begins to affect the management of its natural resources and the socio-political fabric of the "new land."
- Describe the agri-spiritual relationship between plant and mahi'ai; and the fish and the lawai'a.
- Discuss the ancient and present management value of water.
- Describe and assist in the reconstruction of lo'i kaloandlokoi'a.
- Describe and discuss the current resources management practices, which augment or negate ancient practices.
- Research and replicate an artifact of his or her choice.

MICR 140L: General Microbiology Lab

Laboratory course illustrating fundamental techniques and concepts of microbiology, such as microscopic observations, aseptic transfer, microorganism classification and identification, environmental factors influencing microorganisms, biochemistry of microorganisms, ecological microbiology, and medical microbiology. This course is designed to complement MICR 130. Primarily for students in Agripharmatech, nursing, dental hygiene and nutrition. Science laboratory course.

Credits: 2

Prerequisites:

Credit for or registration in MICR 130; placement into Math 24, 25, 26, 28, 29, 82 or higher.

Program: Microbiology

Student Learning Outcomes:

- Operate equipment used in microbiology laboratory.
- Prepare growth media.
- Perform aseptic transfer.
- Identify microorganisms using morphological and physiological tests.
- Follow biosafety procedures.
- Produce lab reports using the standard scientific format.

OCN 201L: Science of the Sea Lab

Experiments, computer exercises and field trips demonstrating the geological, physical, chemical and biological principles, and equipment, of earth and ocean sciences.

Credits: 1

Prerequisites:

Credit for or registration in OCN 201 or equivalent preparation or consent of instructor.

Program: Oceanography

Recommended:

High school algebra and chemistry; ability to use a computer.

Student Learning Outcomes:

- Develop a practical understanding of the principals of oceanography.
- Use the methodology of marine biology and oceanography to define and solve problems independently and collaboratively.
- Use a wide variety of laboratory and field techniques with accuracy, precision and safety.
- Accurately interpret biological and oceanographic information.
- Demonstrate proficient library, mathematical and computer skills in data gathering and analysis.
- Apply scientific concepts to environmental and societal issues.
- Apply their learning in an off-campus professional setting.

PHYL 141L: (Formerly Zool 141l) Human Anatomy and Physiology I Lab

Laboratory to accompany ZOOL 141. Reinforces the facts and concepts of human anatomy and physiology discussed in ZOOL 141 through dissections, examination of models, laboratory activities, and other hands-on experiences. This course is intended for students entering health care or medically related fields such as nursing, physical therapy and medical technology.

Credits: 1

Prerequisites:

Credit for or registration in ZOOL 141 or equivalent preparation or consent of instructor.

Program: Physiology

Student Learning Outcomes:

- Use the scientific method to design and conduct a clinical research study.
- Describe the anatomy of the integumentary, skeletal, muscular, and nervous systems from prepared slides, skeleton models, and real and virtual animal dissections.
- Use basic laboratory equipment (microscopes, slides, and dissecting tools) to observe and characterize human tissues.
- Use critical thinking to analyze and interpret clinical data.
- Prepare an oral presentation and written summary of lab activities using the scientific method.

PHYL 142L: (Formerly Zool 142l) Human Anatomy and Physiology II Lab

Laboratory to accompany ZOOL 142. Reinforces the facts and concepts of human anatomy and physiology discussed in ZOOL 142 through dissections, examination of models, laboratory activities, and other hands-on experiences. This course is intended for students entering health care or medically related fields such as nursing, physical therapy and medical technology.
Credits: 1
Prerequisites:
Credit for or registration in ZOOL 142 or equivalent preparation or consent of instructor.
Program: Physiology
Student Learning Outcomes:

- Use the scientific method to design and conduct a clinical research study.
- Describe the anatomy of the endocrine, circulatory, lymphatic, respiratory, digestive, urinary, and reproductive systems from prepared slides, models, and real and virtual animal dissections.
- Use basic laboratory and medical equipment (microscopes, sphygmomanometers, stethoscopes, ECG apparatus, & respiratory spirometers) to evaluate functions of the above body systems.
- Use critical thinking to analyze and interpret clinical data.
- Prepare an oral presentation and written summary of lab activities using the scientific method.

PHYS 122L: Introduction to Physical Science Lab

Lab experiments illustrating topics and methods in the Physical Sciences with emphasis in Physics and Chemistry. Designed for nonscience majors.
Credits: 1
Prerequisites:
Credit for or registration in PHYS 122 or consent of instructor.
Program: Physics
Student Learning Outcomes:

- Apply the scientific method to a selected group of topics in physics and chemistry.
- Collect, report and analyze data obtained in a laboratory setting in a manner exhibiting organization, proper documentation and critical thinking.
- Manipulate data and apply quantitative techniques, such as graphing and statistical analysis.
- Demonstrate a basic understanding of the standard instruments used in physics and chemistry.
- Identify environmental factors, which affect the outcome of an experiment or observation and apply basic error analyses techniques.

PHYS 151L: College Physics I Lab

Experiments in statics, mechanics, energy, waves, and friction.
Credits: 1
Prerequisites:
Credit for or registration in PHYS 151.
Program: Physics
Student Learning Outcomes:

- Apply the scientific method to physical science systems involving mechanics, energy, simple oscillatory systems, gas laws and fluid dynamics.
- Collect, report and analyze data obtained in a laboratory setting in a manner exhibiting organization, proper documentation and critical thinking.
- Manipulate data and apply quantitative techniques, such as graphing and statistical analysis.
- Demonstrate a basic understanding of the standard instruments used in physics.
- Identify environmental factors, which affect the outcome of an experiment or observation and apply basic error analyses techniques.

PHYS 152L: College Physics II Lab

Experiments in electricity, magnetism, optics, and modern physics.
Credits: 1

Prerequisites:
Credit for or registration in PHYS 152.
Program: Physics
Student Learning Outcomes:

- Apply the scientific method to physical science systems involving thermodynamics, static and dynamic laws of electricity and magnetism, electrical and electronic circuit analysis, electromagnetic radiation, optical systems, and the fundamentals of atomic and nuclear physics.
- Collect, report and analyze data obtained in a laboratory setting in a manner exhibiting organization, proper documentation and critical thinking.
- Manipulate data and apply quantitative techniques, such as graphing and statistical analysis.
- Demonstrate a basic understanding of the standard instruments used in physics.
- Identify environmental factors, which affect the outcome of an experiment or observation and apply basic error analyses techniques.

PHYS 170L: General Physics I Lab

This laboratory course is a rigorous, calculus-based study for professional or engineering majors. Laboratory exercises are designed to reinforce the fundamental concepts of kinematics, mechanics, energy, waves and thermodynamics. (3hourslaboratory)
Credits: 1
Co-Requisites:
Credit for or registration in PHYS 170.
Program: Physics
Student Learning Outcomes:

- Demonstrate an experimental understanding of some basic physical concepts and theories.
- Demonstrate familiarity with various instruments and their use in making reliable and precise measurements.
- Calculate a result with the appropriate number of significant figures.
- Analyze data using calculation and graphical methods.
- Organize an accurate and complete laboratory notebook.

PHYS 272L: General Physics II Lab

This laboratory course is a rigorous, calculus-based study for professional or engineering majors. Laboratory exercises are designed to reinforce the fundamental concepts of electricity, magnetism, light and optical theory.
Credits: 1
Prerequisites:
Credit for or registration in PHYS 272.
Program: Physics
Student Learning Outcomes:

- Demonstrate experimental understanding of some basic physical concepts and theories.
- Demonstrate familiarity with various instruments and learn to make reliable measurements.
- Calculate a result with the appropriate number of significant figures.
- Analyze data using calculation and graphical methods.
- Organize an accurate and complete laboratory notebook.

SCI 210L: Polynesian Voyaging: Seamanship and Stewardship Lab

Laboratory/field trip course designed to acquire seamanship skills and apply knowledge of astronomy, geology, oceanography, meteorology, marine biology, ethnobotany and archaeology through sailing and environmental exploring activities. Laboratory/field trip course is also designed to apply knowledge of Polynesian skills and modern science to the impact on the environment due to human settlement, especially in Hawai'i.

Credits: 1
Lab Hours: 3
Prerequisites:
1. Minimum water skills and survival requirements Student must demonstrate an: -Ability to swim a minimum of 500 yards in the open ocean using any strokes, except backstroke. -Ability to tread water for 30 minutes in the open ocean. (Note: Accredited water skill and survival tests passed within the past year are acceptable upon instructor approval. The swim test must be completed by the date of the first sailing lab.)

2. Health Clearance: from a licensed physician must be provided. (Note: Health clearance submitted within the past year is acceptable upon instructor approval. Health clearance must be submitted by the date of the first sailing lab.)
Program: Science
Recommended:
Credit for or concurrent enrollment in SCI 210.

Student Learning Outcomes:

- Apply both traditional Polynesian skills and modern scientific methods when engaged in sailing and environmental exploring activities.
- Apply basic sailing and navigational skills to prepare and carry out a sailing plan.
- Apply water safety skills.
- Conduct basic canoe operations, including rigging, sailing and maintenance.
- Identify Polynesian-introduced plants and native plants that are valuable for voyaging and discuss their value as food source, medicine, building material, and cordage.
- Identify common marine organisms found in Hawaii and know what to do when stung or bitten, and know which marine organisms is suitable as a food source.
- Respond to navigational and environmental problems using knowledge of constellations, wayfinding, geology, oceanography, weather forecasting, and ecology.

ZOOL 200L: Marine Biology Lab

Companion laboratory to ZOOL 200, Marine Biology. Practical, hands-on experiences in marine biology. Laboratory/fieldtrip class.
Credits: 1
Prerequisites:
Credit for or registration in ZOOL 200 or consent of instructor.
Program: Zoology
Student Learning Outcomes:

- Use the scientific method of inquiry to investigate biological phenomena.
- Apply the concepts learned in ZOOL 200 to an experimental and hands-on observational setting.
- Collect, reduce, and interpret biological data.
- Prepare written objective reports describing and interpreting experimental and observational results.
- Demonstrate the use of some of the standard tools of the biological scientist, such as microscopes, scales, spectrophotometers, computers, and other analytical tools.
- Demonstrate the use of specialized tools and methods frequently used in the study of the marine environments and the organisms that live in these environments.