

A.S. in Biology

College Learning Outcomes Matrix: Rate each course from 1 to 5 with 5 being the most important.

A.S. in Biology	Year of SLO Review	1. Written, Oral and Visual Communication:	2. Scientific and Quantitative Reasoning:	3. Critical Thinking/ Problem Solving:	4. Information Literacy:	GE	DEGREE
BIOL 107 Human Biology *	12/13	3	3	4	3	X	X
BIOL 108A Human Sexuality *	11/12	3	2	5	2	X	X
BIOL 109 Heredity and Evolution						X	X
BIOL 110 Introduction to Biology *	11/12	3	4	5	2	X	X
BIOL 110L Introduction to Biology Laboratory *	11/12	4	5	5	1	X	X
BIOL 112A Biology for Biology Majors I	11/12	3	4	4	3	X	X
BIOL 112B Biology for Biology Majors II	11/12	3	4	4	4	X	X
BIOL 112C Biology for Biology Majors III *	11/12	3	5	4	3	X	X
BIOL 120 Human Anatomy *	11/12	4	3	5	2	X	X
BIOL 138/GEOL 138 Introduction to Environmental Science *	13/14	2	4	5	3	X	X
BIOL 224 Human Physiology *	11/13	3	5	4	3	X	X
BIOL 235 General Marine Biology	13/14	3	4	4	3	X	X
BIOL 240 Microbiology *	12/13	4	4	4	3	X	X
BIOL/PSY 251 Biology Psychology	13/14	Ask psy?	Ask psy?	Ask psy?	Ask psy?	X	X
BIOL 100 Nutrition *	13/14	3	3	4	3	X	X
BIOL 162 General Ecology	13/14	3	3	5	2	X	X
BIOL 142 Environmental Policy and Planning	13/14						X
BIOL 145 Ethics in Science	13/14	3	3	3	3		X
BIOL 159 Introduction to Aquatic Biology	13/14	3	3	3	1		X
BIOL 237 Marine Ecology Field Studies	13/14	3	3	3	1		X
BIOL/ELND 160 Soil: Ecology and Management	13/14	4	3	5	3	x	
BIOL 147 Food, People, and the Environment (not on GE list below?)	12/13	3	4	5	5		X
BIOL 171 Biology of Marine Mammals	12/13	3	3	3	2		X
BIOL 246 Field Ecology	12/13	3	3	3	1		X

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A.S. in Biology	Year of SLO Review	1. Written, Oral and Visual Communication:	2. Scientific and Quantitative Reasoning:	3. Critical Thinking/ Problem Solving:	4. Information Literacy:	GE	DEGREE
BIOL/GEOL 250 Scientific Research and Reporting		5	5	5	3		X
BIOL 101 Field Biology		2	3	3	1		X
BIOL 143 Stewardship of Marin Parks and Open Space		3	4	5	5		X
BIOL 148 Marin County Agriculture		3	4	5	5		X
BIOL 161 Field Botany		3	4	4	5		X
BIOL 164 Introduction to Mammalogy		2	3	3	1		X
BIOL 165 The World of Insects		3	3	3	5		X
BIOL 167 Introduction to Herpetology		2	3	3	1		X
BIOL 169A Introduction to Ornithology A		2	3	3	1		X
BIOL 169B Introduction to Ornithology B		2	3	3	1		X
BIOL 170 Biology of Marine Animals		2	3	3	1		X
BIOL 245 Field Ecology of Marin		2	3	3	1		X
BIOL 104 The Ecology of Infectious Diseases		4	3	3	3		
BIOL 140 Environmental Field Techniques							
BIOL 150 Environmental Science Seminar and Fieldwork		5	5	5	1		
BIOL 165L Introduction to Insect Biodiversity Laboratory		2	4	5	5		
BIOL 99 General Science *	11/12	3	4	4	2		
BIOL 270 Practicum in Identification and Taxonomy		2	5	5	3		

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GENERAL EDUCATION SLOS

WHAT ASSIGNMENTS DO YOU GIVE IN THESE CLASSES THAT ASSESS THE FOLLOWING GE SLOS? What assessment tools do you use? Assess only SLOs that you rated 4 or 5.

A.S. in Biology	1. Written, Oral and Visual Communication:	2. Scientific and Quantitative Reasoning:	3. Critical Thinking/Problem Solving:	4. Information Literacy:	GE	DEGREE
BIOL 107 Human Biology	Essays, MC Test, term paper	Essays, questions applying scientific method	Essays, MC Tests, Case studies	Essays, MC Tests, term paper	X	X
BIOL 108A Human Sexuality			Personal experience papers		X	X
BIOL 109 Heredity and Evolution					X	X
BIOL 110 Introduction to Biology	Essays, MC Test	Research paper/exam, Essays, MC Test	Research papers, Essays, MC Test	Essays, MC Test	X	X
BIOL 110L Introduction to Biology Laboratory	Essays, MC Test	Essays, MC Test	Essays, MC Test	Essays, MC Test	X	X
BIOL 112A Biology for Biology Majors I		questions applying scientific method	Case studies		X	X
BIOL 112B Biology for Biology Majors II	Essays, MC Test	Essays, MC Test	Essays, MC Test	Essays, MC Test	X	X
BIOL 112C Biology for Biology Majors III		Laboratory exercises & experiments	Genetics problems; restriction fragment analysis; notebook discussions.		X	X
BIOL 120 Human Anatomy	Exam/practical questions, digestive journey, muscle packet	Exam/practical, muscle packet	Case studies, exams/practicals, muscle packet, digestive journey		X	X
BIOL 138/GEOL 138 Introduction to Environmental Science	Oral written exams/research papers	Oral written exams/research papers	Research papers		X	X
BIOL 224 Human Physiology		questions applying scientific method	Case studies		X	X
BIOL 235 General Marine Biology	Field research papers/oral written exam	Field research papers/oral written exam	Research papers		X	X
BIOL 240 Microbiology	Essays, MC Test	Essays, MC Test	Essays, MC Test	Essays, MC Test	X	X
BIOL/PSY 251 Biology Psychology					X	X
BIOL 100 Nutrition	Essays, MC Test	Essays, MC Test	Essays, MC Test	Essays, MC Test	X	X
BIOL 162 General Ecology	Essays, MC Test	Essays, MC Test, Field research papers/oral written exam	Essays, MC Test, Field research papers/oral written exam	Essays, MC Test	X	X
BIOL 142 Environmental Policy and Planning						X
BIOL 145 Ethics in Science	????	????	????	????		X
BIOL 159 Introduction to Aquatic Biology		Field research papers/oral written exam	Field research papers/oral written exam	????		X
BIOL 237 Marine Ecology Field Studies		Field research papers/oral written exam	Field research papers/oral written exam			X
BIOL/ELND 160 Soil: Ecology and Management	Essays, MC Test	Essays, MC Test	Essays, MC Test	Essays, MC Test	X	

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BIOL 112A Majors' Biology -- Animals, Protozoans, Evolution	5*
BIOL 112B Majors' Biology -- Plants, Algae, Fungi and Ecology	5**
BIOL 112C Majors' Biology -- Molecules, Cells, Prokaryotes and Genetics	5***

CHEM 115 Survey of Organic and Biochemistry 4

Or

CHEM131 General Chemistry I 5

And

CHEM132 General Chemistry II 5

MATH104 Plane Trigonometry 3

PHYS 108A General Physics I 5

PHYS 108B General Physics II 5

*Recommended: Biology 110 and Biology 110L

**Recommended: Biology 110, 110L and Chemistry 131

*** Prerequisite: Chemistry 131. Chemistry 131 may be taken concurrently with Biology 112C.

SLOS

Upon completion of this degree, students will be able to:

1. Demonstrate basic understanding of the major areas of modern biology, at levels of organization ranging from molecules to the biosphere.
2. Explain how important observations, hypotheses, experiments and revisions of theory have led to our modern understanding in these areas.
3. Analyze critically current biological information in articles, news reports and other forms in the print and electronic media.
4. Use procedures and equipment essential to modern biological research in the laboratory and the field.

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THESE DEGREE OUTCOMES EQUAL WHICH COURSE OUTCOMES FOR THESE COURSES?

A.S. in Biology	1. Demonstrate basic understanding of the major areas of modern biology, at levels of organization ranging from molecules to the biosphere.	2. Explain how important observations, hypotheses, experiments and revisions of theory have led to our modern understanding in these areas.	3. Analyze critically current biological information in articles, news reports and other forms in the print and electronic media.	4. Use procedures and equipment essential to modern biological research in the laboratory and the field.
BIOL 112A Biology for Biology Majors I	4. Understand and will be able to demonstrate knowledge of the characteristics of all the major animal phyla as well as a thorough understanding of the circumstances under which these phyla evolved.	3. Draw conclusions from data that allow the students to support or refute hypothesis and make a case for alternative hypotheses.	1. Demonstrate the ability to engage in clear and careful scientific inquiry and show that they can ask pertinent questions about zoological phenomena and formulate hypotheses based on those questions, drawing on scientific concepts and principles.	2. Apply deliberate and through observational skills in conducting an experiment and collecting data and be able to test hypotheses, and show that they can organize and summarize data and render them in a way that is accurate and comprehensible in both verbal and graphical modes.

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A.S. in Biology	1. Demonstrate basic understanding of the major areas of modern biology, at levels of organization ranging from molecules to the biosphere.	2. Explain how important observations, hypotheses, experiments and revisions of theory have led to our modern understanding in these areas.	3. Analyze critically current biological information in articles, news reports and other forms in the print and electronic media.	4. Use procedures and equipment essential to modern biological research in the laboratory and the field.
BIOL 112B Biology for Biology Majors II	1. Describe the scope and goals of ecology in relation to other biological and non-biological areas of inquiry 2. Describe the major levels of ecological structure and function and their essential and emergent properties 3. Describe a species' habitat and niche 4. Construct simple population models and explain their usefulness 7. Explain the importance of ecological engineering in analysis of ecosystems 8. Explain the importance of the major types of ecological interactions in the world 9. Describe the structure and function of vascular plants at the organismal, organ, organ system, tissue and cell levels of organization 10. Describe the reproductive biology of vascular plants, showing understanding of the structures involved 11. Name the major groups of algae, plants and fungi and place correctly in the modern biological classification system 12. Describe the reproductive biology of major groups of fungi, showing understanding of the structures involved 13. Explain the special features of the ecology of algae plants and fungi			5. Perform a biodiversity assessment 6. Conduct a trophic analysis of ecological communities
BIOL 112C Biology for Biology Majors III	1. learn the basic principles of biology that govern cells and organisms.	4. develop the fundamentals of writing and presenting scientific studies.	3. learn how to critically evaluate scientific data. 4. develop the fundamentals of writing and presenting scientific studies.	2. develop skill in applying the scientific method. 4. develop the fundamentals of writing and presenting scientific studies.

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IN WHICH COURSES ARE THESE DEGREE SLOS ASSESSED? Use “I” for Intro, “P” for Practice and “M” for Mastery.

A.S. in Biology	BIO112A	BIO112B	BIO11C				
Written and Oral Communication	P	P	P				
Scientific and Quantitative Reasoning:	M	P	P				
Critical Thinking:	M	P	P				
Problem Solving:	M	P	M				
Information Literacy	P	M	M				

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DEGREE SLOS

WHAT ASSIGNMENTS DO YOU GIVE IN THESE CLASSES THAT ASSESS THE FOLLOWING DEGREE SLOS? What assessment tools do you use? Assess only SLOs that you rated 4 or 5.

A.S. in Biology Courses that count for both GE and Degrees or Certificates	1. Demonstrate basic understanding of the major areas of modern biology, at levels of organization ranging from molecules to the biosphere.	2. Explain how important observations, hypotheses, experiments and revisions of theory have led to our modern understanding in these areas.	3. Analyze critically current biological information in articles, news reports and other forms in the print and electronic media.	4. Use procedures and equipment essential to modern biological research in the laboratory and the field.
BIOL 112A Biology for Biology Majors I	Design and complete original research project	Exam questions	Design and complete original research project	Design and complete original research project
BIOL 112B Biology for Biology Majors II	Diagram nutrient cycles	Essays about fungal evolution	Essay question: ecological implications of oyster farming	Experiment: measure aquatic pH
BIOL 112C Biology for Biology Majors III	Exam questions including short essays.	Group discussion of selected biological review papers.	Group discussion of selected biological review papers.	Laboratory exercises & experiments; especially written discussions.

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BIOL_100	Nutrition	Revise Course
Expected Outcomes for Student:		
A. Enumerate the types of nutrients necessary for health and fitness B. Identify the nutrients that provide energy for metabolism C. Illustrate how vitamins and mineral contribute to a healthy diet D. Analyze the role of various nutrients in human metabolism E. Describe characteristics of a healthy diet F. Illustrate how the human body uses nutrients G. Estimate energy requirements of a person H. Investigate how food is produced and the amount of energy needed for food production I. Evaluate their food intake and its effect on sustainability J. Propose modifications to their diet for better health and sustainability K. Conduct library and internet research to prepare reports and communicate their findings		
BIOL_104	THE ECOLOGY OF INFECTIOUS DISEASE	Revise Course
Expected Outcomes for Student:		
1. Describe the natural history of infectious disease and its significance. 2. Explain the biology of disease producing microorganisms and how it affects the location, spread, and control of particular infectious diseases. 3. Compare the relationship between microorganisms, vectors and hosts. 4. Define the basic tenets of geographic medicine including climactic, biological and sociological factors. 5. Explain the role that human activity has played and continues to play in the occurrence of epidemics.		
BIOL_107	Human Biology	New Course
Expected Outcomes for Student:		
Upon completion of this course, students will be able to: 1. Discuss the important structures and functions of the body's major systems, as well as the interactions between these systems. 2. Use this knowledge as a context to gain deeper understandings into disease processes and treatments, as well as current medical and ethical debates relating to human biology. 3. Use their knowledge of human biology to make informed decisions regarding the maintenance/improvement of their own health, as well as community health issues. 4. Understand and appreciate the strengths and limitations of the scientific method to explore and find solutions to specific questions. 5. Have the foundations in human biology required to take national certifications in wellness-related fields such as personal training and group fitness instruction.		
BIOL_109	HEREDITY AND EVOLUTION	Revise Course
Expected Outcomes for Student:		
1. Discuss historically, our approach to the understanding of genetics and evolution. 2. Analyze problems using the rules of genetics. 3. Compare the potential benefits and risks associated with new genetic technologies. 4. Evaluate the risks in ignoring natural selection and evolution when determining medical and environmental policy.		

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BIOL_110	Introduction to Biology	Revise Course
Expected Outcomes for Student:		
Upon completion of this course, students will be able to: A. demonstrate general understanding of biology as a science by: 1. comparing and contrasting the subject matter of biology and other natural sciences with respect to scale and other unique properties 2. describing the important areas of biology and organizing them by scale or other characteristics 3. comparing and contrasting scientific methods and non-scientific methods of explaining phenomena and producing information 4. distinguishing science from pseudoscience and primary scientific information from secondary scientific information B. use major principles, generalizations or theories of biology and related sciences to explain specific phenomena, including, 1. use of plate tectonic theory to explain current positions and characteristics of continents and ocean basins. 2. use of atomic theory to explain properties of different atoms and molecules, (especially biological macromolecules) and changes in chemical reactions. 3. use of cell theory and genetic theory to explain the continuity and change in cells and multicellular organisms, including inheritance of observable traits and interactions between genes and their environment. 4. use of principles of homeostasis and positive and negative feedback to explain changes in physiological status of organisms, including health and disease. 5. use of ecological theory to explain structure of communities and ecosystems and movement of energy and nutrients within the biosphere. 6. use of evolutionary theory to explain the Earth's biological diversity. C. apply understanding of biology to suggest solutions to major problems of current human society, including 1. threats to environmental health, including massive species extinctions, disruption of community relationships and altered ecosystem function. 2. threats to human health, including starvation, disease and lowered quality of life.		

BIOL_110L	Introduction to Biology Laboratory	Revise Course
Expected Outcomes for Student:		
Upon completion of this course, students will be able to: 1. Carry out observations, construct hypotheses, perform experiments and interpret them in the context of important biological theories. 2. Use correctly the international system (SI or metric system) of measurement. 3. Select correct kind of microscope for viewing small specimens, prepare specimens for viewing and bring them into good focus with optimum illumination. 4. Use Bunsen burners, glassware and other laboratory equipment safely and effectively. 5. Use ecological measuring equipment safely and effectively in the field. 6. Carry out random sampling procedures of large populations. 7. Produce simple, well-labeled lined drawings. 8. Make simple mathematical summaries of data. 9. Draw and interpret simple graphs and construct and interpret data tables. 10. Produce coherent written records of laboratory and field work. 11. Work effectively in small groups.		

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BIOL_112A	Majors' Biology: Animals, Protozoa, Evolution and Classification	Revise Course
Expected Outcomes for Student:		
Upon completion of this course, students will be able to: 1. Demonstrate the ability to engage in clear and careful scientific inquiry and show that they can ask pertinent questions about zoological phenomena and formulate hypotheses based on those questions, drawing on scientific concepts and principles. 2. Apply deliberate and through observational skills in conducting an experiment and collecting data and be able to test hypotheses, and show that they can organize and summarize data and render them in a way that is accurate and comprehensible in both verbal and graphical modes. 3. Draw conclusions from data that allow the students to support or refute hypothesis and make a case for alternative hypotheses. 4. Understand and will be able to demonstrate knowledge of the characteristics of all the major animal phyla as well as a thorough understanding of the circumstances under which these phyla evolved.		
BIOL_112B	Majors' Biology: Plants, Algae, Fungi and Ecology	Revise Course
Expected Outcomes for Student:		
Upon completion of this course, students will be able to: 1. Describe the scope and goals of ecology in relation to other biological and non-biological areas of inquiry 2. Describe the major levels of ecological structure and function and their essential and emergent properties 3. Describe a species' habitat and niche 4. Construct simple population models and explain their usefulness 5. Perform a biodiversity assessment 6. Conduct a trophic analysis of ecological communities 7. Explain the importance of ecological engineering in analysis of ecosystems 8. Explain the importance of the major types of ecological interactions in the world 9. Describe the structure and function of vascular plants at the organismal, organ, organ system, tissue and cell levels of organization 10. Describe the reproductive biology of vascular plants, showing understanding of the structures involved 11. Name the major groups of algae, plants and fungi and place correctly in the modern biological classification system 12. Describe the reproductive biology of major groups of fungi, showing understanding of the structures involved 13. Explain the special features of the ecology of algae plants and fungi		
BIOL_112C	Majors' Biology: Molecules, Cells, Prokaryotes and Genetics	Revise Course
Expected Outcomes for Student:		
Upon completion of this course, students will be able to: 1. learn the basic principles of biology that govern cells and organisms. 2. develop skill in applying the scientific method. 3. learn how to critically evaluate scientific data. 4. develop the fundamentals of writing and presenting scientific studies.		

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BIOL_116	Principles of Animal and Plant Diversity	Revise Course
Expected Outcomes for Student:		
Upon completion of this course, students will be able to: 1. Perform a biodiversity assessment. 2. Describe the structure and function of vascular plants at the organismal, organ, organ system, tissue and cell levels of organization. 3. Describe the reproductive biology of vascular plants, showing understanding of the structures involved. 4. Name the major groups of algae, plants and fungi and place correctly in the modern biological classification system. 5. Describe the reproductive biology of major groups of fungi, showing understanding of the structures involved. 6. Explain the special features of the ecology of algae plants and fungi. 7. Demonstrate the ability to engage in clear and careful scientific inquiry and show that they can ask pertinent questions about zoological, botanical and bacterial phenomena and formulate hypotheses based on those questions, drawing on scientific concepts and principles. 8. Apply deliberate and thorough observational skills in conducting an experiment and collecting data and be able to test hypotheses, and show that they can organize and summarize data and render them in way that is accurate and comprehensible in both verbal and graphical modes. 9. Draw conclusions from data that allow the students to support or refute hypotheses and make a case for alternative hypotheses. 10. Understand and will be able to demonstrate knowledge of the characteristics of all the major groups of organisms as well as thorough understanding of the circumstances under which these organisms evolved.		

BIOL_120	Human Anatomy	Revise Course
Expected Outcomes for Student:		
Upon completion of this course, students will be able to: 1. Describe the basic anatomical design of the human body, including its bilateral symmetry, tube within a tube design, cavities, and fluid compartments. 2. Name the organ systems of the body and describe their basic structural design and function. 3. Recognize and describe the major organs of each system, including their location in the body, gross anatomy, histological features, and function. 4. Differentiate under the microscope the four major tissue types, identify the subtypes of each of the major tissue types, and locate them in body structures. 5. Identify the specific anatomical structures listed in the lab manual using models, charts, specimens, microscope slides, prosections, cadavers, and skeletons. 6. Identify and use a variety of written, multimedia, online and other resources for learning anatomy. 7. Perform a simple dissection of some major organs or structures in both human and non-human animal specimens.		
BIOL_138	Introduction to Environmental Sciences	Revise Course
Expected Outcomes for Student:		
Course goals are to develop an understanding of how ecosystems provide the necessary services for all life on earth. Students will also develop alternative perspectives concerning various world views that can lead to valuing the earth system. Science will provide us with the foundations and processes needed to understand human systems and how our activities affect the planet. An understanding of science will assist us in finding and implementing scientific, technological, economic, and political solutions to environmental problems. Assess and apply environmental, ecology and sustainability principles to modern life and a technologically based society in a lab setting. Assess the methodology utilized by environmental professionals to apply environmental indicators to assess current trends in our environment. Examine the application of a systems approach to environmental and ecological principles used by government agencies, industry and other organizations to minimize environmental impact on natural resources.		

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BIOL_142	Environmental Policy and Decision-Making	Revise Course
Expected Outcomes for Student:		
1. Describe main features of the most important pieces of federal, state, and local environmental legislation. 2. Examine critically an environmental issue of choice. 3. Identify and understand impacts of federal, state, or local policies or regulations that apply to the issue. 4. Specify the history, benefits, and/or drawbacks of our current environmental policies and planning processes.		

BIOL_143	Stewardship of Marin Parks and Open Space	Revise Course
Expected Outcomes for Student:		
1. Describe major concepts and beliefs underlying the designation of parklands as different from other lands used by our modern civilization. 2. Outline the major events that led to our parklands being set aside for the special uses they serve today. 3. Describe the major processes of natural change that influence any piece of parkland and require attention from park visitors and park managers. 4. Describe the human activities that take place on parklands and how they relate to the modern concept of stewardship. 5. Name and describe both sides of some of the principal conflicts over approaches to managing parklands that have made headlines in Marin and around the world. 6. Explain the principal challenges and methods of management on the ground, as seen in the plans and activities articulated by the major agencies and individuals managing parkland in Marin. 7. Offer some suggestions of what should be done in a specific parkland and make a few predictions of what will likely happen to it in the future if these suggestions are followed and/or not followed. 8. Describe the general nature of park and open space management jobs and decide whether they represent a possible career option. 9. Use insights and experience gained from studying the process of solving local environmental problems in meeting environmental challenges of the future.		

BIOL_147	Food, People, Health and the Environment	Revise Course
Expected Outcomes for Student:		
1. Describe the major components of the global food system: production, distribution and consumption. 2. Give a brief outline of the history of food procurement by humans 3. Describe the contributions of remaining hunting, gathering and fishing systems in the modern world. 4. Describe the major types of modern agricultural production: pastoral, un-irrigated agriculture and irrigated agriculture 5. Describe the major modern agricultural production systems and give the major inputs, outputs and environmental impacts involved in each. 6. Describe the modern food distribution system and its recent changes. 7. Describe the history of human population growth, including significant points of change. 8. Describe the history of eating patterns in different populations, noting common parallels 9. Explain significant human health conditions affected by eating patterns and nutrition. 10. Describe divergent views on the future of the food system, including those of the "cornucopians," and the "catastrophists," the "conventional," "organic" and "sustainable" farmers, the "concentrated" and the "dispersed" distribution systems and the "vegetarian," "carnivore," "omnivore" and "locavore" consumers.		

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BIOL_148	Marin County Agriculture	Revise Course
Expected Outcomes for Student:		
Describe the physical, biological and cultural environment of Marin and its suitability for agricultural production. Outline the agricultural history of Marin. Describe important past crises for Marin agric. and how they were resolved. List the principle current agric. products and production systems of Marin and some challenges and innovations associated with each. Use personal experience with specific people and places involved in local agricultural production in discussions of issues affecting local agriculture.		

BIOL_150	Environmental Science Seminar and Fieldwork	New Course
Expected Outcomes for Student:		
Upon completion of this course, students will be able to: A. Describe a significant environmental problem that he/she worked to solve during the semester. B. Explain the major constraints or challenges of that problem which needed to be addressed in order to make progress C. List the final skills required in order to address the problem D. Explain the final outcome of the problem-solving efforts E. Describe the particular nich occupied by the agency or organization with which he/she worked		

BIOL_160	Soil: Ecology and Management	New Course
Expected Outcomes for Student:		
Upon completion of this course, students will be able to: A. Describe the effect of soil use on human evolution. B. Recognize various physical and biological soil constituents. C. Describe how soils form and evolve. D. Describe interactions between soil properties and water and nutrient cycles. E. Discuss the behaviour of plant nutrients in the soil. F. Analyze the effect of soil manipulations on soil properties and plant growth. G. Interpret the results of a soil analysis. H. Discuss the properties of various fertilizers. I. Propose sustainable soil management. J. Conduct research to find information about soil properties. A. Learn to use equipment and tools used in soil research B. Separation and characterization of soil components C. Determination of soil structure D. Techniques to assess soil/water relationships E. Techniques to assess salts in soils F. Separation and analysis of biological components of the soil web life G. Determination of the role of various nutrients on plant development H. Techniques for soil sampling I. Determination of soil pH J. Interpreting soil maps K. Analysis of soil profiles L. Physical and chemical characteristics of sand, silt, clay, and organic matter.		

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M. Determination of physical and chemical properties of soil-less planting media
 N. Interpreting soil analysis
 O. Compost: process and properties

BIOL_161	Field Botany	Revise Course
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Expected Outcomes for Student:

By the end of the semester, students should be able to:

1. Explain the principal ecological factors most likely to be responsible for producing the groupings of plants encountered at most places in the county.
2. Recognize the major ecological communities of Marin by their dominant plant species and discuss important ecological process for each community.
3. Identify basic concepts of plant anatomy and evolution necessary to use the keys in the most-recently published local flora to identify selected species of plants and place them correctly in the larger system of botanical classification.
4. Recognize the approximately thirty plant families that include the vast majority of common plants likely to be encountered in the county.
5. Demonstrate proper use of basic field and laboratory equipment needed for plant identification, including preparation of botanical specimens for later study in laboratory and herbarium.
6. Discuss predictions for the future of the Marin flora, including likely changes to populations of rare and endangered species as well as to populations of weeds introduced by humans.

BIOL_162	General Ecology	Revise Course
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Expected Outcomes for Student:

1. describe how the study of environmental sciences can provide students insight into the dynamic mechanisms that shape the ecology of local biotic communities
2. describe how the study of environmental sciences can provide students insight into the dynamic mechanisms that shape the ecology of the planet.
3. Identify the natural history of key organisms of local biotic communities.
4. discuss the interrelationships of all levels of ecological study.

BIOL_164	Introduction to Mammalogy	Revise Course
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Expected Outcomes for Student:

1. Identify skulls of most local species of mammals to genus level.
2. Identify tracks and sign, including scat of all local carnivore species to genus level and most other mammals to family level.
3. Demonstrate their knowledge of the natural history, ecology and behavior of all most North American families of mammals including all orders mentioned in lectures.
4. Demonstrate the process of studying mammals effectively in the field and laboratory.

BIOL_165L	Introduction to Insect Biodiversity Laboratory	New Course
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Expected Outcomes for Student:

Upon completion of this course, students will be able to:

1. Identify major structures of insect internal external and internal anatomy, when necessary with aid of hand lens or with stereoscopic or compound microscope.
2. Identify unique anatomical structures of different insect orders, when necessary with aid of hand lens or with stereoscopic or compound microscope.
3. Identify on sight major orders and families of insects, when necessary with aid of hand lens or with stereoscopic or compound microscope.
4. Use dichotomous keys to identify insects to family level, when necessary with aid of hand lens or with stereoscopic or compound microscope.
5. Use print and electronic media to access information about individual insect species.
6. Locate and collect insects in major field habitats, using appropriate field equipment.
7. Describe major ecological niches of selected important families and genera.
8. Prepare wet, dry and microscopic specimens of insects for further study, using appropriate laboratory equipment.

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9. Describe how modern insect faunas are the result of present and past evolutionary and ecological factors.

BIOL_167	Introduction to Herpetology	Revise Course
Expected Outcomes for Student:		
Upon completion of this course students will be able to: ~identify most local species of amphibians and reptiles to genus level. ~demonstrate their knowledge of the natural history, ecology and behavior of all local species and most North American families of amphibians and reptiles including some common families worldwide. ~capture and study amphibians and reptiles effectively in the field and laboratory ~conduct a population ecology study on most any species of Western North American lizard. ~demonstrate care of most amphibians and reptiles in a vivarium.		

BIOL_169A	Introduction to Ornithology A	Revise Course
Expected Outcomes for Student:		
Upon completion of this course, students will be able to: 1. Understand how bird form, function, anatomy, physiology, flight mechanics and migration enable birds to have become adapted to a wide variety of habitats. 2. Understand how birds are integral to the sustainable functioning of ecosystems. 3. Identify California birds as well as be able to efficiently use equipment associated with the study of birds in the field, including binoculars, spotting scopes, mist nets and recorders.		

BIOL_169B	Introduction to Ornithology B	New Course
Expected Outcomes for Student:		
Upon completion of this course, students will be able to: 1. Understand the principles of ornithology and how bird behavior, vocal behavior, bird reproductive biology, and avian ecology enable birds to have become adapted to a wide variety of habitats. 2. Identify birds in the field and understand their behavior as well as complete a scientific study of involving nesting, courting, feeding, and migrating behavior. 3. Efficiently use equipment associated with the study of birds in the field, including binoculars, spotting scopes, mist nets and recorders.		

BIOL_224	Human Physiology	Revise Course
Expected Outcomes for Student:		
Upon completion of this course, students will be able to: 1. List the general functions of the body systems. 2. Explain physical and chemical principles related to cellular activity. 3. Explain relationships between structure and function at the molecular, cellular, and systems level of biological organization. 4. Recognize the complex interrelationships between various systems and processes in the body. 5. Summarize the homeostatic mechanisms by which body functions are known to be regulated. Distinguish between basic physiological changes and pathological changes in the body. 6. Practice several basic clinical and research techniques for studying and measuring various physiological parameters, including blood pressure, hematocrit, urine parameters, electrocardiograms, and respiratory volumes and flows. 7. Identify the processes of scientific investigation and be able to design and carry out an independent study in physiology. 8. Interpret and evaluate data with respect to the hypotheses, as well as previously published research. 9. Demonstrate work through formal scientific writing.		

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BIOL_ 235	General Marine Biology	Revise Course
Expected Outcomes for Student:		
Upon completion of this course, students will be able to demonstrate that they: 1) analyze, compare, contrast and distinguish various survival strategies of the most common species of marine invertebrate and vertebrates living in the rocky, sand flat, and mud flat intertidal regions of Central California 2) inventory the diversity of marine taxa and differentiate the fundamental oceanographic processes of which these species must endure to survive 3) discuss concepts and debate in marine biology along with the differences and similarities in terrestrial and other life systems 4) relate to the scientific method and research techniques to understand marine ecosystems 5) examine a fish or shark and inspect anatomical functional morphology 6) appraise and differentiate local holoplankton as well as meroplankton using a microscope 7) interpret, recognize and discuss the foundation knowledge and skills to commence to upper division studies in marine sciences 8) demonstrate they are safe while conducting marine-related field work or teaching in a variety of marine habitats. 9) explain the extent of and how human actions are interfering with the functioning of and contributing to the collapse of marine ecosystems.		

BIOL_ 237	Marine Ecology Field Studies	Revise Course
Expected Outcomes for Student:		
1. Explain how plants and animals inhabiting marine communities have evolved with and adjusted to the physical factors (including spacial and temporal variables associated with rocky intertidal, mud and sandflats, estuaries and redwood forests) of these communities. 2. Describe the Zonation and phylogeny of marine invertebrates common to these intertidal and forest systems. 3. List the life histories and ecology of marine Algae. 4. Demonstrate how to preserve marine algae for a herbarium collection. 5. Explain the latest findings in Marine microbe ecology. 6. Identify marine and coastal forest birds. 7. Identify common marine and coastal forest mammals of the Pacific Northwest Region. 8. Explain and understand the diving physiology of marine mammals. 9. Describe how wave dynamics and long-shore drift shape the geomorphology of sandy beaches. 10. Explain Coastal forest ecology and succession. 11. Explain and understand how logging practices have destroyed the Pacific Northwest forests. 12. Describe the biology of owls of the Pacific Northwest forests and identify the most common species of owl by call.		

BIOL_ 240	Microbiology	Revise Course
Expected Outcomes for Student:		
1. Recognize the importance of microorganisms to the ecology of the planet. 2. Describe the role that microorganisms play in health and disease. 3. Evaluate the major issues surrounding biotechnology research and development. 4. Isolate and identify common disease producing organisms. 5. Demonstrate proper handling of microorganisms in a laboratory.		

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CourseID	Title		Action
BIOL_244 A	Alaska Field Studies		New Course
Expected Outcomes for Student:			
Upon completion of Biol 244A, students will be able to:			
1. Judge, appraise, evaluate and debate the evidence for Global Climate Disruption 2. Categorize trees, arctic flowers and birds of Alaska 3. Demonstrate and apply the use of a dichotomous key 4. Explain and describe the common mammal tracks of Alaska 5. Name, recall and relate to all of the mammals common to Alaska 6. Name, recall and relate to all of the birds common to Alaska 7. Discuss how mammals, trees, perennials, and birds are adapted to extremely cold conditions 8. Distinguish and differentiate all marine mammals common to coastal Alaska including pinnipeds, cetaceans and sea otters			
BIOL_244 B	Greater Yellowstone Ecosystem Field Studies	New Course	
Expected Outcomes for Student:			
Upon completion of Biol 244B, students will be able to:			
1. Judge, appraise, evaluate and debate the evidence for the need for Bison and wolf restoration in the Greater Yellowstone Ecosystem 2. Categorize trees, flowers and birds of the Greater Yellowstone Ecosystem 3. Demonstrate and apply the use of a dichotomous key 4. Explain and describe the common mammal tracks of Yellowstone 5. Name, recall and relate to all of the mammals common to Yellowstone 6. Name, recall and relate to all of the birds common to Yellowstone 7. Discuss how mammals, trees, perennials, and birds are adapted to cold winter conditions 8. Distinguish and differentiate the various microbial thermophilic communities common to the hydrothermal structure of Yellowstone.			

BIOL_251	Biological Psychology	Revise Course
Expected Outcomes for Student:		
Upon completion of this course, students will be able to:		
1. Define the major terms, identify and label the major areas, and explain major concepts of biological psychology. 2. Apply the terms, concepts, areas, and processes to the various activities and mental processes of human beings. 3. Question, analyze, and assess a variety of explanations for human behavior and mental processes from the perspectives of biological psychology.		

BIOL_270	Practicum in Identification and Taxonomy	New Course
Expected Outcomes for Student:		
Upon completion of this course, students will be able to use available library, laboratory and museum resources to correctly identify to species level a minimum of five species of local organisms of a chosen group and discuss their places in the modern biological classification system.		