Ecology and Conservation Biology (Biol 116) - Syllabus Addendum for Prospective Teachers Ricklefs, R. E., (2001). *The Economy of Nature*, 5th Edition. W.H. Freeman & Co		
Chapter	**Subject Matter Requirements for Prospective Teachers General Science**	**Academic content standards for kindergarten through grade twelve, adopted by the California State Board of Education**
Ch 6-Energy in the Ecosystem	4.1a Explain energy flow and nutrient cycling through ecosystems (e.g., food chain, food web)	Science Content Standards for California Public Schools, Grade 4: 2a Students know plants are the primary source of matter and energy entering most food chains; 2b Students know producers and consumers are related in food chains and food webs and may compete with each other for resources in an ecosystem; 2c Students know decomposers including many fungi, insects and microorganisms recycle matter from dead plants and animals; Grade 6: 5a Students know energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis and then from organism to organism through food webs; 5b Students know matter is transferred over time from one organism to others in the food web and between organisms and the physical environment
	4.1b Explain matter transfer (e.g., biogeochemical cycles) in ecosystems	Science Content Standards for California Public Schools, Grade 4: 3c Students know many plants depend on animals for pollination and seed dispersal, and animals depend on plants for food and shelter
	4.1c Distinguish between abiotic and biotic factors in an ecosystem	Science Content Standards for California Public Schools, Grade 4: 3a Students know ecosystems can be characterized by

		their living and nonliving components; 3c Students know many plants depend on animals for pollination and seed dispersal, and animals depend on plants for food and shelter; Grade 6: 5e Students know the number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors such as quantiti3es of light and water, a range of temperatures, and soil composition
Ch 7-Pathways of Elements in the Ecosystem	4.1a Explain energy flow and nutrient cycling through ecosystems (e.g., food chain, food web)	Science Content Standards for California Public Schools, Grade 4: 2a Students know plants are the primary source of matter and energy entering most food chains; 2b Students know producers and consumers are related in food chains and food webs and may compete with each other for resources in an ecosystem; 2c Students know decomposers including many fungi, insects and microorganisms recycle matter from dead plants and animals; Grade 6: 5a Students know energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis and then from organism to organism through food webs; 5b Students know matter is transferred over time from one organism to others in the food web and between organisms and the physical environment
	4.1b Explain matter transfer (e.g., biogeochemical cycles) in ecosystems	Science Content Standards for California Public Schools, Grade 4: 3c Students know many plants depend on animals for pollination and seed

		dispersal, and animals depend on plants for food and shelter
	4.1d Compare the roles of photosynthesis and respiration in an ecosystem	Science Content Standards for California Public Schools, Grade 5: 2f Students know plants use carbon dioxide and energy from sunlight to build molecules of sugar and release oxygen; 2g Students know plant and animal cells break down sugar to obtain energy, a process resulting in carbon dioxide and water (respiration)
Ch 8-Nutrient Regeneration in Terrestrial and Aquatic Ecosystems	4.1a Explain energy flow and nutrient cycling through ecosystems (e.g., food chain, food web)	Science Content Standards for California Public Schools, Grade 4: 2a Students know plants are the primary source of matter and energy entering most food chains; 2b Students know producers and consumers are related in food chains and food webs and may compete with each other for resources in an ecosystem; 2c Students know decomposers including many fungi, insects and microorganisms recycle matter from dead plants and animals; Grade 6: 5a Students know energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis and then from organism to organism through food webs; 5b Students know matter is transferred over time from one organism to others in the food web and between organisms and the physical environment
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Ch 13-Populations Structures	4.1f Identify and explain factors that affect population types and size (e.g., competition for resources, niche, habitats, species and population interactions, abiotic factors)	Science Content Standards for California Public Schools, Grade 4: 3b Students know that in any particular environment some kinds of plants and animals survive well, some survive less well and some cannot survive at all; Grade 6: 5c students know that populations of organisms can be categorized by the functions they serve in an ecosystem; 5d Students know different kinds of organisms may play similar ecological roles in similar biomes
Ch 14-Population Growth and Regulation	4.1f Identify and explain factors that affect population types and size (e.g., competition for resources, niche, habitats, species and population interactions, abiotic factors)	Science Content Standards for California Public Schools, Grade 4: 3b Students know that in any particular environment some kinds of plants and animals survive well, some survive less well and some cannot survive at all; Grade 6: 5c students know that populations of organisms can be categorized by the functions they serve in an ecosystem; 5d Students know different kinds of organisms may play similar ecological roles in similar biomes
Ch 15-Temporal and Spatial Dynamics of Populations	4.1f Identify and explain factors that affect population types and size (e.g.,	Science Content Standards for California Public Schools, Grade 4: 3b

	competition for resources, niche, habitats, species and population interactions, abiotic factors)	Students know that in any particular environment some kinds of plants and animals survive well, some survive less well and some cannot survive at all; Grade 6: 5c students know that populations of organisms can be categorized by the functions they serve in an ecosystem; 5d Students know different kinds of organisms may play similar ecological roles in similar biomes
Ch 16-Population Genetics and Evolution	4.1f Identify and explain factors that affect population types and size (e.g., competition for resources, niche, habitats, species and population interactions, abiotic factors)	Science Content Standards for California Public Schools, Grade 4: 3b Students know that in any particular environment some kinds of plants and animals survive well, some survive less well and some cannot survive at all; Grade 6: 5c students know that populations of organisms can be categorized by the functions they serve in an ecosystem; 5d Students know different kinds of organisms may play similar ecological roles in similar biomes
Ch 17-Predation and Herbivory	4.1e Describe interrelationships within and among ecosystems (e.g., predator/prey)	Science Content Standards for California Public Schools, Grade 4: 3a Students know ecosystems can be characterized by their living and nonliving components; 3b Students know that in any particular environment some kinds of plants and animals survive well, some survive less well and some cannot survive at all; Grade 6: 5c students know that populations of organisms can be categorized by the functions they serve in an ecosystem
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	population interactions, abiotic factors)	animals survive well, some survive less well and some cannot survive at all; Grade 6: 5c students know that populations of organisms can be categorized by the functions they serve in an ecosystem; 5d Students know different kinds of organisms may play similar ecological roles in similar biomes
Ch 18-Dynamics of Predation	4.1e Describe interrelationships within and among ecosystems (e.g., predator/prey)	Science Content Standards for California Public Schools, Grade 4: 3a Students know ecosystems can be characterized by their living and nonliving components; 3b Students know that in any particular environment some kinds of plants and animals survive well, some survive less well and some cannot survive at all; Grade 6: 5c students know that populations of organisms can be categorized by the functions they serve in an ecosystem
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Ch 19-Competition	4.1e Describe interrelationships within and among ecosystems (e.g., predator/prey)	Science Content Standards for California Public Schools, Grade 4: 3a Students know ecosystems can be characterized by their living and nonliving components; 3b Students know that in any particular environment some kinds of

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Ch 20- Coevolution and Mutualism	4.1e Describe interrelationships within and among ecosystems (e.g., predator/prey)	Science Content Standards for California Public Schools, Grade 4: 3a Students know ecosystems can be characterized by their living and nonliving components; 3b Students know that in any particular environment some kinds of plants and animals survive well, some survive less well and some cannot survive at all; Grade 6: 5c students know that populations of organisms can be categorized by the functions they serve in an ecosystem
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Chapter	**Biology/Life Science Subject Matter Requirements**	**Academic content standards for kindergarten through grade twelve, adopted by the California State Board of Education**
Ch 3- Adaptation to Aquatic and Terrestrial Environments	3.3a Distinguish between the accommodation of an individual organism to its environment and the gradual adaptation of a lineage of organisms through genetic change	*Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 6g * Students know how to distinguish between the accommodation of an individual organism to its environment and the gradual adaptation of alineage of organisms through genetic change*
Ch 13-Population Structures	4.3b Analyze the fluctuations in population size in an ecosystem due to the relative rates of birth, immigration, emigration, and death	*Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 6b* Students know *how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size*
Ch 14-Population Growth and Regulation	4.3b Analyze the fluctuations in population size in an ecosystem due to the relative rates of birth, immigration, emigration, and death	*Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 6b* Students know *how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size*
Ch 15-Temporal and Spatial Dynamics of Populations	4.3b Analyze the fluctuations in population size in an ecosystem due to the relative rates of birth, immigration, emigration, and death	*Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 6b* Students know *how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of*

		nonnative species, or changes in population size
Ch 17-Predation and Herbivory	4.3a Describe various species interactions (e.g., predator/prey, parasitism, mutualism, commensalism, competition)	*Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 6b* Students know *how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size*
Ch 18-Dynamics of Predation	4.3a Describe various species interactions (e.g., predator/prey, parasitism, mutualism, commensalism, competition)	*Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 6b* Students know *how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size*
Ch 19-Competion	4.3a Describe various species interactions (e.g., predator/prey, parasitism, mutualism, commensalism, competition)	*Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 6b* Students know *how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size*
Ch 20-Coevolution and Mutation	4.3a Describe various species interactions (e.g., predator/prey, parasitism, mutualism, commensalism, competition)	*Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 6b* Students know *how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size*
Ch 21-Community Structure	4.2a Evaluate the importance of stability of producers, consumers, and decomposers	*Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 6e* Students know *a vital part of an ecosystem is the stability of its producers and decomposers; 6f*

		Students know *at each link in a food web some energy is stored in newly made structures but much energy is dissipated into the environment as heat. This dissipation may be represented in an energy pyramid*
Ch 23-Biodiversity	4.1a Define biodiversity and describe the effects on biodiversity of alteration of habitat	*Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 6a* Students know *biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats; 6b* Students know *how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size*
Ch 24-History and biogeography	3.2a Analyze fossil evidence with regard to biological diversity, episodic speciation, and mass extinction	*Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 8e* Students know *how to analyze fossil evidence with regard to biological diversity, episodic speciation, and mass extinction*
Ch 25-Extinction and Conservation	4.3c Analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, and changes in population size	*Science Content Standards for California Public Schools, Grades 9-12, Biology/Life Sciences: 6c* Students know *how fluctuations in population size in an ecosystem are determined by the relative rates of birth, immigration, emigration, and death*