



GACE® Biology Assessment Test II (026) Curriculum Crosswalk

Required Coursework Numbers

Subarea I. Scientific Inquiry, Processes, Technology, and Society (30%)															
<i>Objective 1: Understands the nature of scientific inquiry and processes, including the collection and analysis of data</i>															
A. Understands the processes involved in scientific inquiry and experimental design															
• Identifying problems based on observations															
• Formulating and testing hypotheses															
• Identifying experimental variables and controls															
• Drawing scientific conclusions															
• Formulating theories based on accumulated data															
• Using scientific sources and communicating findings appropriately															
B. Understands the processes involved in scientific data collection and manipulation															
• Common units of measurement (metric and English units), including unit conversions															
• Scientific notation and significant figures in collected data															
• Linear versus logarithmic scales															
• Choosing appropriate types of graphs or charts															

Required Coursework Numbers

<ul style="list-style-type: none"> Interpreting data, including identifying patterns and trends, drawing conclusions, and making predictions 																
<ul style="list-style-type: none"> Basic data analysis, including determining mean, precision, accuracy, and sources of error 																
C. Understands the multidisciplinary nature of biology and the use of scientific models																
<ul style="list-style-type: none"> Chemical nature of biology 																
<ul style="list-style-type: none"> Mathematics in biology 																
<ul style="list-style-type: none"> Physical laws and principles governing biological systems 																
<ul style="list-style-type: none"> Selecting appropriate models for a given purpose (e.g., physical, conceptual, mathematical) and knowing the limitations of the models 																
D. Understands the major historical developments of biology and the contributions of major historical figures																
<ul style="list-style-type: none"> Accepted principles and theories change and develop over time 																
<ul style="list-style-type: none"> Development of germ theory and cell theory 																
<ul style="list-style-type: none"> Developments in heredity, evolution, and ecology 																
<ul style="list-style-type: none"> Developments in the understanding of the nature and structure of genetic material 																
<ul style="list-style-type: none"> Developments in the classification of organisms 																

Required Coursework Numbers

E. Understands the procedures for correct preparation, storage, use, and disposal of laboratory materials																
<ul style="list-style-type: none"> Preparation for classroom or field use of materials, such as preparing solutions and staining slides 																
<ul style="list-style-type: none"> Appropriate storage of chemicals, biological specimens, and other materials 																
<ul style="list-style-type: none"> Appropriate and safe use of materials, including chemicals and laboratory specimens 																
<ul style="list-style-type: none"> Safe disposal of biological specimens, chemicals, and solutions 																
F. Understands the appropriate and safe use and care of laboratory equipment																
<ul style="list-style-type: none"> Optical equipment, such as microscopes, spectrophotometers, and UV light sources 																
<ul style="list-style-type: none"> Separation equipment, such as equipment used for gel electrophoresis, chromatography, and centrifugation 																
<ul style="list-style-type: none"> Measurement, mixing, and heating equipment, such as balances, stirrers, and Bunsen burners 																
<ul style="list-style-type: none"> Sterilization equipment, such as autoclaves and ovens 																

Required Coursework Numbers

G. Understands safety and emergency procedures for science classrooms and laboratories																	
• Use of material safety data sheets (MSDS)																	
• Use of personal safety equipment; e.g., gloves, goggles, lab coats																	
• Use of laboratory safety equipment; e.g., fire extinguishers, eyewash stations, emergency showers																	
<i>Objective 2: Understands the relationship of science and technology to society and the environment</i>																	
A. Understands the management of natural resources and the impact of science and technology on the environment																	
• Agriculture, forestry, wildlife, and fisheries practices																	
• Renewable and/or sustainable use of resources																	
• Extraction of mineral and energy resources and resource management, including waste management and recycling																	
• Conservation, including habitat preservation, habitat restoration, and species protection																	
• Pollution, including nonpoint sources of pollution and burning of fossil fuels																	
• Pollution mitigation, including green building and environmental cleanup																	

Required Coursework Numbers

B. Understands the impact of human activity and natural phenomena on society																		
• Economic and social consequences																		
• Natural disaster management																		
• Climate change (such as global warming), sea levels, and flooding																		
• Epidemiology																		
• Agriculture and soil erosion																		
• Estuary and wetland degradation																		
• Water management																		
• Production, use, and disposal of consumer products																		
C. Understands the ethical and societal issues arising from the use of science and technology																		
• Ethical research concerns, including use of stem cells and toxic chemicals																		
• Ethical use of technology, genetic information, genetically modified organisms, and cloning																		
Subarea II. Organismal Biology (30%)																		
<i>Objective 1: Understands characteristics contributing to the diversity of life, including classification systems</i>																		
A. Understands the historical and current biological classification systems of organisms																		
• Kingdom system																		
• Domain system																		
• Cladistics																		

Required Coursework Numbers

B. Understands the characteristics of the major animal phyla																
• Body plans, including radial symmetry versus bilateral symmetry																
• Body cavities, including coelomates, pseudocoelomates, and acoelomates																
• Protostomes versus deuterostomes																
• Modes of reproduction (sexual versus asexual)																
• Modes of temperature regulation (endotherm versus ectotherm)																
C. Understands the organizational hierarchy of multicellular organisms																
• Cells																
• Tissues																
• Organs																
• Organ systems																
<i>Objective 2: Understands anatomy and physiology of major animal phyla</i>																
A. Understands the anatomy and physiology of major organ systems																
• Cardiovascular and respiratory																
• Digestive and excretory																
• Nervous and endocrine																

Required Coursework Numbers

• Reproductive																	
• Immune																	
B. Understands how homeostasis is maintained in organisms																	
• Role of organs or tissues, such as the kidney, adrenals, and hypothalamus																	
• Role of hormones, such as insulin and antidiuretic hormone																	
• Feedback mechanisms, including negative and positive																	
• Role of behaviors, including diurnal, nocturnal, hibernation, and basking																	
C. Understands reproduction, development, and growth																	
• Gamete formation																	
• Fertilization																	
• Embryonic development																	
• Growth, development, and aging																	
<i>Objective 3: Understands anatomy and physiology of major plant phyla</i>																	
A. Understands the characteristics of the major divisions, including life cycles and reproductive strategies																	
• Vascular versus nonvascular																	
• Angiosperms versus gymnosperms																	
• Monocot versus eudicot (dicot)																	

Required Coursework Numbers

<ul style="list-style-type: none"> • Alternation of generations, including gametophyte and sporophyte 																	
<ul style="list-style-type: none"> • Seed and spore dispersal and pollination strategies 																	
B. Growth and development and response to environment																	
<ul style="list-style-type: none"> • Tissues, including dermal, parenchyma, cortex, and meristem 																	
<ul style="list-style-type: none"> • Vascular, including xylem and phloem 																	
<ul style="list-style-type: none"> • Flowers, stems, leaves, and roots 																	
<ul style="list-style-type: none"> • Plant tropisms 																	
C. Understands how plants obtain and transport water and inorganic nutrients																	
<ul style="list-style-type: none"> • Roots 																	
<ul style="list-style-type: none"> • Xylem transport 																	
<ul style="list-style-type: none"> • Control of moisture, including transpiration through stomata 																	
D. Understands how plants transport and store products of photosynthesis																	
<ul style="list-style-type: none"> • Products, including simple and complex carbohydrates 																	
<ul style="list-style-type: none"> • Phloem transport 																	
<ul style="list-style-type: none"> • Storage and structural molecules, including starch and cellulose, respectively 																	
<ul style="list-style-type: none"> • Storage structures, including plastids, vacuoles, and tubers 																	

Required Coursework Numbers

Subarea III. Ecology: Organisms and Environment (40%)																
<i>Objective 1: Understands biosphere organization and factors affecting organism interactions and population size</i>																
A. Understands the hierarchical structure of the biosphere																
• Organisms																
• Populations																
• Communities																
• Ecosystems																
• Biomes																
B. Understands relationships within and between species																
• Forms of symbiosis																
• Predation																
• Competition and territoriality																
• Altruistic behaviors																
C. Understands how biotic and abiotic components of an ecosystem influence population size																
• Resource availability and abiotic factors																
• Habitat and niche																
• Competition and predation																
• Density-dependent versus density-independent selection																

Required Coursework Numbers

D. Understands the relationship between reproductive strategies, mortality rates, and population growth																			
• Sexual versus asexual reproduction																			
• r-strategists versus K-strategists																			
• Exponential growth																			
• Logistic growth and carrying capacity																			
<i>Objective 2: Understands the characteristics of biomes, energy flow in ecosystems, and major biogeochemical cycles</i>																			
A. Understands the changes that occur during ecological succession																			
• Primary versus secondary succession																			
• Biomass, diversity, productivity, and habitat changes during succession																			
B. Understands the types of biomes and energy flow in the biomes																			
• Aquatic versus terrestrial biomes																			
• Trophic levels, including pyramids of biomass and pyramids of energy																			
• Food chains and food webs																			
• Keystone species																			
• Flow of energy versus flow of matter																			
C. Understands biogeochemical cycles																			
• Water cycle																			
• Carbon cycle																			

Required Coursework Numbers

• Nitrogen cycle																
• Phosphorus cycle																
<i>Objective 3: Understands interactions among ecosystems and effects of their disruption by natural disturbances or humans</i>																
A. Understands the effects of natural disturbances on biodiversity and ecosystems																
• Temporal and spatial disturbances, including climate, fire, and disease																
• Fragmentation of ecosystems																
• Natural ecosystem recovery																
B. Understands the connections among ecosystems on a local and a global scale																
• Natural flow of material between ecosystems																
• Movement of organisms																
C. Understands how humans affect ecological systems and biodiversity																
• Pollution, including greenhouse gases and acid precipitation																
• Habitat destruction																
• Introduced and re-introduced species																
• Remediation, including reforestation and mine reclamation																
• Transport of materials by humans																