

Michigan Science Curriculum High School Content Expectations (Grades 8-12)

Addressed by 4-H Great Lakes & Natural Resources Camp

Adopted by the Michigan Department of Education in October 2006, for application by schools for 9th graders beginning Fall 2007. Source: http://www.michigan.gov/mde/0,1607,7-140-38924_41644_42814---,00.html

The educational experiences at camp help prepare, reinforce and enrich what youth have already studied and will study at school in the future related to biology and earth sciences based on the expectation established by the Michigan Department of Education in 2006. Through a variety of camp sessions, youth will be exposed to four of the five Michigan science curriculum standards in earth science and three of the five standards in biology for grades 8 to 12. This is shown in the below table. These were identified by a 4-H volunteer who is a certified high school science teacher in Michigan and served as the camp director in 2007.

About the table:

The first column of the table indicates the 4 parts and code designation of the Michigan science curriculum:

- First in the code is Discipline (noted by the first letter)
- Second is Standard (noted by the first number)
- Third is the Content Statement (noted by the second number)
- Fourth is the Expectation (noted by the second letter)
- A “p” may also be listed between the 2nd and 3rd parts above and indicates it is a prerequisite for high school subjects.

For example, the code B1.1E is the Biology Discipline (B), Standard 1, Statement 1, Expectation E.

The first section of the table is Standard 1 of both Biology and Earth Science. Following sections focus on the standards of biology and earth science independently with each new standard in bold.

Biology & Earth Science	Michigan Science Curriculum Standards	Sessions that Expose Campers to Listed Standards
Biology & Earth Science	Standard B1 & E1: Inquiry, Reflection, and Social Implications	
Biology Discipline, Standard 1, Content Statement 1, Expectation E (B1.1E) & Earth Sci. Discipline, Standard 1, Statement 1 Expectation E (E1.1E)	Describe a reason for a given conclusion using evidence from an investigation.	Coastal Wetlands Fisheries Forestry Watersheds Wildlife
B1.1f E1.1f	Predict what would happen if the variables, methods, or timing of an investigation were changed.	Fisheries Watersheds
B1.1g E1.1g	Use empirical evidence to explain and critique the reasoning used to draw a scientific conclusion or explanation.	Fisheries

B1.2B E1.2B	Identify and critique arguments about personal or societal issues based on scientific evidence.	Charter Fishing Coastal Wetlands Fisheries Forestry Watersheds Wildlife
B1.2E E1.2E	Evaluate the future career and occupational prospects of science fields.	Charter Fishing Coastal Wetlands Fisheries Forestry Watersheds Wildlife All afternoon recreation sessions

Biology		
B2	Standard B2: Organization and Development of Living Systems	
Biology Discipline, Life Science Content, prerequisite Standard 2, Statement1, Expectation E (L2.p1E)	Compare and contrast how different organisms accomplish similar functions (e.g., obtain oxygen for respiration, and excrete waste). (<i>prerequisite</i>)	Charter Fishing Coastal Wetlands Fisheries Forestry Wildlife
L2.p2A	Describe how organisms sustain life by obtaining, transporting, transforming, releasing, and eliminating matter and energy. (<i>prerequisite</i>)	Charter Fishing Coastal Wetlands Fisheries Forestry Wildlife
B2.2g	Propose how moving an organism to a new environment may influence its ability to survive and predict the possible impact of this type of transfer.	Charter Fishing Coastal Wetlands Fisheries Forestry Wildlife
B2.3C	Explain how stability is challenged by changing physical, chemical, and environmental conditions as well as the presence of disease agents.	Charter Fishing Coastal Wetlands Fisheries Forestry Watersheds Wildlife
B3	Standard B3: Interdependence of Living Systems and the Environment	
L3.p2A	Describe common relationships among organisms and provide examples of producer/consumer, predator/prey, or parasite/host relationship. (<i>prerequisite</i>)	Charter Fishing Fisheries Forestry Wildlife
L3.p2B	Describe common ecological relationships between and among species and their environments (competition, territory, carrying capacity, natural balance, population, dependence, survival, and other biotic and abiotic factors). (<i>prerequisite</i>)	Charter Fishing Coastal Wetlands Fisheries Forestry

L3.p3A	Identify the factors in an ecosystem that influence fluctuations in population size. (<i>prerequisite</i>)	Charter Fishing Coastal Wetlands Fisheries Wildlife
L3.p4A	Recognize that, and describe how, human beings are part of Earth's ecosystems. Note that human activities can deliberately or inadvertently alter the equilibrium in ecosystems.	Charter Fishing Coastal Wetlands Fisheries Forestry Watersheds Wildlife Select afternoon sessions – sea lamprey presentation, marine sanctuary tour
B3.4A	Describe ecosystem stability. Understand that if a disaster such as flood or fire occurs, the damaged ecosystem is likely to recover in stages of succession that eventually result in a system similar to the original one.	Charter Fishing Coastal Wetlands Fisheries Forestry Watersheds Wildlife
B3.4B	Recognize and describe that a great diversity of species increases the chance that at least some living organisms will survive in the face of cataclysmic changes in the environment.	Charter Fishing Coastal Wetlands Fisheries Forestry Wildlife
B3.4C	Examine the negative impact of human activities.	Charter Fishing Coastal Wetlands Fisheries Forestry Watersheds Wildlife Select afternoon sessions –snorkeling, sea lamprey presentation, marine sanctuary tour
B3.5B	Explain the influences that affect population growth.	Charter Fishing Fisheries Forestry Wildlife
B3.5C	Predict the consequences of an invading organism on the survival of other organisms.	Charter Fishing Coastal Wetlands Fisheries Wetlands Sea lamprey presentation

Earth Science		
E2	Standard E2: Earth Systems	

Earth Sci. Discipline, Standard 2, Statement 1, Expectation C (E2.1C)	Explain, using specific examples, how a change in one system affects other Earth systems.	Coastal Wetlands Forestry Watersheds Wildlife
E3	Standard E3: Solid Earth	
E3.p1B	Explain how physical and chemical weathering leads to erosion and the formation of soils and sediments. (<i>prerequisite</i>)	Coastal Wetlands Watersheds Quarry visit
E3.p1C	Describe how coastal features are formed by wave erosion and deposition. (<i>prerequisite</i>)	Coastal Wetlands
E3.p2A	Identify common rock-forming minerals (quartz, feldspar, biotite, calcite, hornblende). (<i>prerequisite</i>)	Quarry visit
E2.p2B	Identify common igneous (granite, basalt, andesite, obsidian, pumice), metamorphic (schist, gneiss, marble, slate, quartzite), and sedimentary (sandstone, limestone, shale, conglomerate) rocks and describe the processes that change one kind of rock to another. (<i>prerequisite</i>)	Quarry visit
E3.p3A	Describe geologic, paleontologic, and paleoclimatologic evidence that indicates Africa and South America were once part of a single continent.	Quarry visit
E4	Standard E4: Fluid Earth	
E4.p1B	Analyze the flow of water between the elements of a watershed, including surface features (lakes, streams, rivers, wetlands) and groundwater.	Coastal Wetlands Watersheds
E4.p1C	Describe the river and stream types, features, and process including cycles of flooding, erosion, and deposition as they occur naturally and as they are impacted by land use decisions. (<i>prerequisite</i>)	Coastal Wetlands Fisheries Watersheds
E4.p1D	Explain the types, process, and beneficial functions of wetlands.	Coastal Wetlands
E.p3A	Describe how glaciers have affected the Michigan landscape and how the resulting landforms impact our state economy.	Coastal Wetlands Watersheds
E4.p3C	Explain the formation of the Great Lakes.	Coastal Wetlands
E4.1A	Compare and contrast surface water systems (lakes, rivers, streams, wetlands) and groundwater in regard to their relative sizes as Earth's freshwater reservoirs and the dynamics of water movement (inputs and outputs, residence times, sustainability).	Watersheds
E4.1C	Explain how water quality in both groundwater and surface systems is impacted by land use decisions.	Coastal Wetlands Watersheds
E5	Standard E5: The Earth in Space and Time	
E5.3D	Describe how index fossils can be used to determine time sequence.	Evening Presentation Quarry visit