

**MICHIGAN ALIGNMENT FOR NIH SUPPLEMENT HUMAN GENETIC VARIATION**

<b>HUMAN GENETIC VARIATION</b>		
<b>Michigan Grade Level Content Expectations: Biology</b>		
<b>Activity</b>	<b>Standard</b>	<b>GLCE</b>
3	<b>B1.1A</b>	Generate new questions that can be investigated in the laboratory or field.
3, 4	<b>B1.1B</b>	Evaluate the uncertainties or validity of scientific conclusions using an understanding of sources of measurement error, the challenges of controlling variables, accuracy of data analysis, logic of argument, logic of experimental design, and/or the dependence on underlying assumptions.
1, 3	<b>B1.1C</b>	Conduct scientific investigations using appropriate tools and techniques (e.g., selecting an instrument that measures the desired quantity – length, volume, weight, time interval, temperature – with the appropriate level of precision).
1, 2, 3	<b>B1.1D</b>	Identify patterns in data and relate them to theoretical models.
1, 2, 3, 4	<b>B1.1E</b>	Describe a reason for a given conclusions using evidence from an investigation.
1, 2, 3, 4	<b>B1.1G</b>	Use empirical evidence to explain and critique the reasoning used to draw a scientific conclusion or explanation.
3	<b>B1.1H</b>	Design and conduct a systematic scientific investigation that tests a hypothesis. Draw conclusions from data presented in charts or tables.
3	<b>B1.1I</b>	Distinguish between scientific explanations that are regarded as current scientific consensus and the emerging questions that active researchers investigate.
2, 3, 4	<b>B1.2A</b>	Critique whether or not specific questions can be answered through scientific investigations.
2, 3, 4	<b>B1.2B</b>	Identify and critique arguments about personal or societal issues based on scientific evidence.
2, 3	<b>B1.2C</b>	Develop an understanding of a scientific concept by accessing information from multiple sources. Evaluate the scientific accuracy and significance of the information.
1, 2, 3	<b>B1.2D</b>	Evaluate scientific explanations in a peer review process or discussion format.
3	<b>B1.2F</b>	Critique solutions to problems, given criteria and scientific constraints.
2, 3	<b>B1.2H</b>	Describe the distinctions between scientific theories, laws, hypotheses, and observations.
2, 3, 4	<b>B1.2I</b>	Explain the progression of ideas and explanations that lead to science theories that are part of the current scientific consensus or core knowledge.
2, 3, 4, 5	<b>B1.2K</b>	Analyze how science and society interact from an historical, political, economic, or social perspective.
2, 4, 5	<b>B2.3C</b>	Explain how stability is challenged by changing physical, chemical, and environmental conditions as well as the presence of disease agents.
2	<b>B2.3F</b>	Explain how human organ systems help maintain human health.
3	<b>B2.r6E</b>	Analyze the body’s response to medical interventions such as organ transplants, medicines, and inoculations.
1, 2, 3, 4	<b>L4.p2A</b>	Explain that the traits of an individual are influenced by both the environment and the genetics of the individual.

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		Acquired traits are not inherited; only genetic traits are inherited.
1, 2, 3, 5	<b>B4.1B</b>	Explain that the information passes from parents to offspring is transmitted by means of genes that are coded in DNA molecules. These genes contain the information for the production of proteins.
2, 5	<b>B4.2A</b>	Show that when mutations occur in sex cells, they can be passed on to offspring (inherited mutations), but if they occur in other cells, they can be passed on to descendant cells only (noninherited mutations).
2, 5	<b>B4.2D</b>	Predict the consequences that changes in the DNA composition of particular genes may have on an organism (e.g., sickle cell anemia, other).
4	<b>B4.2E</b>	Propose possible effects (on the genes) of exposing an organism to radiation and toxic chemicals.
1, 2, 5	<b>B4.3B</b>	Explain why only mutations occurring in gametes (sex cells) can be passed on to offspring.
2, 5	<b>B4.3C</b>	Explain how it might be possible to identify genetic defects from just a karyotype of a few cells.
1, 2, 3	<b>B4.3D</b>	Explain that the sorting and recombination of genes in sexual reproduction result in a great variety of possible gene combinations from the offspring of two parents.
2, 5	<b>B4.3F</b>	Predict how mutations may be transferred to progeny.
<b>All activities</b>	<b>B4.3G</b>	Explain that cellular differentiation results from gene expression and/or environmental influence (e.g., metamorphosis, nutrition).
5	<b>B4.4B</b>	Explain that gene mutation in a cell can result in uncontrolled cell division called cancer. Also know that exposure of cells to certain chemicals and radiation increases mutations and thus increases the chance of cancer.
2, 3, 4, 5	<b>B4.4C</b>	Explain how mutations in the DNA sequence of a gene may be silent or result in phenotypic change in an organism and in its offspring.
1	<b>B5.1G</b>	Illustrate how genetic variation is preserved or eliminated from a population through natural selection (evolution) resulting in biodiversity.
2	<b>B5.3C</b>	Give examples of ways in which genetic variation and environmental factors are causes of evolution and the diversity of organisms.
2	<b>B5.3D</b>	Explain how evolution through natural selection can result in changes in biodiversity.
1, 2	<b>B5.3E</b>	Explain how changes at the gene level are the foundation for changes in populations and eventually the formation of new species.

**Michigan Grade Level Content Expectations: Algebra I**

<b>Activity</b>	<b>Standard</b>	<b>GLCE</b>
1, 2, 3, 4	<b>L1.2.4</b>	Organize and summarize a data set in a table, plot, chart, or spreadsheet; find patterns in a display of data; understand and critique data displays in the media.
2, 3, 4	<b>S2.1.4</b>	Differentiate between correlation and causation. Know that a strong correlation does not imply a cause-and-effect relationship. Recognize the role of lurking variables in correlation.

**Michigan Grade Level Content Expectations: English Language Arts – High School**

**MICHIGAN ALIGNMENT FOR NIH SUPPLEMENT HUMAN GENETIC VARIATION**

<b>Activity</b>	<b>Standard</b>	<b>GLCE</b>
<b>All activities</b>	<b>CE 1.1.3</b>	Select and use language that is appropriate (e.g., formal, informal, literary, or technical) for the purpose, audience, and context of the text, speech, or visual representation (e.g., letter to the editor, proposal, poem, or digital story).
<b>1, 2, 3, 5</b>	<b>CE 1.1.4</b>	Compose drafts that convey an impression, express an opinion, raise a question, argue a position, explore a topic, tell a story, or serve another purpose, while simultaneously considering the constraints and possibilities (e.g., structure, language, use of conventions of grammar, usage, and mechanics) of the selected form or genre.
<b>All activities</b>	<b>CE 1.2.1</b>	Write, speak, and use images and graphs to understand and discover complex ideas.
<b>All activities</b>	<b>CE 1.2.2</b>	Write, speak, and visually represent to develop self-awareness and insight (e.g., diary, journal writing, and portfolio self-assessment).
<b>All activities</b>	<b>CE 1.3.1</b>	Compose written, spoken, and/or multimedia compositions in a range of genres (e.g., personal narrative, biography, poem, fiction, drama, creative nonfiction, summary, literary analysis essay, research report, or work-related text): pieces that serve a variety of purposes (e.g., expressive, informative, creative, and persuasive) and that use a variety of organizational patterns (e.g., autobiography, free verse, dialogue, comparison/contrast, definition, or cause and effect).
<b>All activities</b>	<b>CE 1.3.2</b>	Compose written and spoken essays or work-related text that demonstrate logical thinking and the development of ideas for academic, creative, and personal purposes: essays that convey the author's message by using an engaging introduction (with a clear thesis as appropriate), well-constructed paragraphs, transition sentences, and a powerful conclusion.
<b>All activities</b>	<b>CE 1.3.5</b>	From the outset, identify and assess audience expectations and needs; consider the rhetorical effects of style, form, and content based on that assessment; and adapt communication strategies appropriately and effectively.
<b>All activities</b>	<b>CE 1.3.7</b>	Participate collaboratively and productively in groups (e.g., response groups, work teams, discussion groups, and committees) – fulfilling roles and responsibilities, posing relevant questions, giving and following instructions, acknowledging and building on ideas and contributions of others to answer questions or to solve problems, offering dissent courteously.
<b>All activities</b>	<b>CE 1.3.9</b>	Use the formal, stylistic, content, and mechanical conventions of a variety of genres in speaking, writing, and multimedia presentations.
<b>2, 3</b>	<b>CE 1.4.1</b>	Identify, explore, and refine topics and questions appropriate for research.
<b>All activities</b>	<b>CE 1.4.2</b>	Develop a system for gathering, organizing, paraphrasing, and summarizing information; select, evaluate, synthesize, and use multiple primary and secondary (print and electronic) resources.
<b>All activities</b>	<b>CE 1.4.4</b>	Interpret, synthesize, and evaluate information/findings in various print sources and media (e.g., fact and opinion, comprehensiveness of the evidence, bias, varied perspectives, motives and credibility of the author, date of publication) to draw conclusions and implications.
<b>All activities</b>	<b>CE 1.5.1</b>	Use writing, speaking, and visual expression to develop powerful, creative and critical messages.

## MICHIGAN ALIGNMENT FOR NIH SUPPLEMENT HUMAN GENETIC VARIATION

<b>All activities</b>	<b>CE 2.1.1</b>	Use a variety of pre-reading and previewing strategies (e.g., acknowledge own prior knowledge, make connections, generate questions, make predictions, scan a text for a particular purpose or audience, analyze text structures and features) to make conscious choices about how to approach the reading based on purpose, genre, level of difficulty, text demands and features.
<b>All activities</b>	<b>CE 2.1.2</b>	Make supported inferences and draw conclusions based on informational print and multimedia features (e.g., prefaces, appendices, marginal notes, illustrations, bibliographies, author's pages, footnotes, diagrams, tables, charts, maps, timelines, graphs, and other visual and special effects) and explain how authors and speakers use them to infer the organization of text and enhance understanding, convey meaning, and inspire or mislead audiences.
<b>All activities</b>	<b>CE 2.1.3</b>	Determine the meaning of unfamiliar words, specialized vocabulary, figurative language, idiomatic expressions, and technical meanings of terms through context clues, word roots and affixes, and the use of appropriate resource materials such as print and electronic dictionaries.
<b>All activities</b>	<b>CE 2.1.5</b>	Analyze and evaluate the components of multiple organizational patterns (e.g., compare/contrast, cause/effect, problem/solution, fact/opinion, theory/evidence).
<b>All activities</b>	<b>CE 2.1.7</b>	Demonstrate understanding of written, spoken, or visual information by restating, paraphrasing, summarizing, critiquing, or composing a personal response; distinguish between a summary and a critique.
<b>All activities</b>	<b>CE 2.1.10</b>	Listen to and view speeches, presentations, and multimedia works to identify and respond thoughtfully to key ideas, significant details, logical organization, fact and opinion, and propaganda
<b>All activities</b>	<b>CE 2.1.11</b>	Demonstrate appropriate social skills of audience, group discussion, or work team behavior by listening attentively and with civility to the ideas of others, gaining the floor in respectful ways, posing appropriate questions, and tolerating ambiguity and lack of consensus.
<b>All activities</b>	<b>CE 2.1.12</b>	Use a variety of strategies to enhance listening comprehension (e.g., monitor message for clarity and understanding, ask relevant questions, provide verbal and nonverbal feedback, notice cues such as change of pace or emphasis that indicate a new point is about to be made; and take notes to organize essential information).
<b>All activities</b>	<b>CE 2.2.2</b>	Examine the ways in which prior knowledge and personal experience affect the understanding of written, spoken, or multimedia text.
<b>All activities</b>	<b>CE 2.3.3</b>	Critically read and interpret instructions for a variety of tasks (e.g., completing assignments, using software, writing college and job applications).
<b>All activities</b>	<b>CE 2.3.6</b>	Reflect on personal understanding of reading, listening, and viewing; set personal learning goals; and take responsibility for personal growth.
<b>All activities</b>	<b>CE 4.1.1</b>	Use sentence structures and vocabulary effectively within different modes (oral and written, formal and informal) and for various rhetorical purposes.
<b>All activities</b>	<b>CE 4.1.2</b>	Use resources to determine word meanings, pronunciations, and word etymologies (e.g., context, print and electronic dictionaries, thesauruses, glossaries, and others).
<b>All activities</b>	<b>CE 4.1.3</b>	Use a range of linguistic applications and styles for accomplishing different rhetorical purposes (e.g., persuading others to change opinions, conducting business transactions, speaking in a public forum, discussing issues informally with peers).

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<b>All activities</b>	<b>CE 4.1.4</b>	Control standard English structures in a variety of contexts (e.g., formal speaking academic prose, business, and public writing) using language carefully and precisely.
<b>All activities</b>	<b>CE 4.1.5</b>	Demonstrate use of conventions of grammar, usage, and mechanics in written texts, including parts of speech, sentence structure and variety, spelling, capitalization, and punctuation.
<b>Michigan Grade Level Content Expectations: Health Education – High School</b>		
<b>Activity</b>	<b>Standard</b>	<b>GLCE</b>
<b>4</b>	<b>2.1</b>	Describe the short-term and long-term health consequences of alcohol, tobacco, and other drug use.
<b>All activities</b>	<b>4.9</b>	Demonstrate the ability to apply listening and assertive communication skills in situations that may involve parents, family members, other trusted adults, peers, boyfriends/girlfriends, and health professionals.
<b>2, 3, 4, 5</b>	<b>4.14</b>	Evaluate the effectiveness of health-related decisions.
<b>2, 5</b>	<b>5.4</b>	Demonstrate the ability to access valid information and resources in one’s community and on the Internet related to personal health issues and concerns.
<b>5</b>	<b>5.7</b>	Apply knowledge about symptoms of illness to determine whether medical care is required.