

Course: Biology Unit #3: <i>Evolution</i>	Year of Implementation: 2026-2027
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Stage One - Desired Results	
Link(s) to New Jersey Student Learning Standards for this course: https://www.state.nj.us/education/cccs/2020/	
● Unit Standards: ○ Content Standards ■ HS-LS-4.1: Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. ■ HS-LS4-2: Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment. ■ HS-LS4-3: Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. ■ HS-LS4-4: Construct an explanation based on evidence for how natural selection leads to adaptation of populations. ■ HS-LS4-5: Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species. ■ HS-LS4-6: Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity ■ HS-ESS2-7: Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.	

- **HS-ETS1-1:** Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

- **21st Century Life & Career Standards**

<https://www.nj.gov/education/standards/clicks/Docs/2020NJSLS-CLKS.pdf>

- 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas
- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice
- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving
- 9.4.12.DC.7: Evaluate the influence of digital communities on the nature, content and responsibilities of careers, and other aspects of society
- 9.4.12.IML.1: Compare search browsers and recognize features that allow for filtering of information.
- 9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources
- 9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions
- 9.4.12.IML.8: Evaluate media sources for point of view, bias, and motivations
- 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

English Companion Standards

https://www.nj.gov/education/standards/ela/Docs/2016NJSLS-ELA_Companion9-10.pdf

- NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
- NJSLSA.R2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
- NJSLSA.R3. Analyze how and why individuals, events, and ideas develop and interact over the course of a text
- NJSLSA.R7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
- NJSLSA.R8 Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence

- NJSLSA.R9. Analyze and reflect on how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.
- NJSLSA.R10. Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.

Interdisciplinary Content Standards

- **RST.11-12.1:** Cite specific evidence to support analysis of evolutionary texts and data.
- **RST.11-12.8:** Evaluate hypotheses and claims in primary or secondary sources (e.g., Darwin's theory vs. modern synthesis).
- **RST.11-12.9:** Synthesize information from multiple formats (e.g., fossil records, molecular data).
- **WHST.11-12.1:** Write arguments using evidence (e.g., natural selection vs. intelligent design debate).
- **WHST.11-12.2:** Write informative texts explaining concepts such as genetic drift, speciation, or adaptation.
- **WHST.11-12.7:** Conduct research on topics like human evolution, resistance in bacteria, or evolutionary trees.
- **S-ID.1-4:** Represent and interpret data sets related to populations and traits.
- **S-IC.1-6:** Make inferences and justify conclusions from sample data (e.g., allele frequency shifts over generations).
- **6.2.12.HistoryCC.1.a:** Analyze how historical scientific discoveries (like evolution) have influenced worldviews.
- **6.1.12.CivicsDP.3.a:** Understand the relationship between public policy and scientific understanding
- ***NJ Statutes:*** NJ State law mandates the inclusion of the following topics in lesson design and instruction as aligned to elementary and secondary curriculum.

Amistad Law: N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35 A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards (N.J.S.A. 18A:35-4.36) A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.

Diversity and Inclusion (N.J.S.A. 18A:35-4.36a) A board of education shall incorporate instruction on diversity and inclusion in an appropriate place in the curriculum of students in grades kindergarten through 12 as part of the district's implementation of the New Jersey Student Learning Standards.

Asian American and Pacific Islanders (AAPI) P.L.2021, c.410 Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416)

For additional information, see

NJ Amistad Curriculum: <https://www.nj.gov/education/amistad/about/>

Diversity and Inclusion: <https://www.nj.gov/education/standards/dei/index.shtml>

- (Sample Activities/ Lessons): <https://www.nj.gov/education/standards/dei/samples/index.shtml>

Asian American and Pacific Islanders:

- [Asian American and Pacific Islander Heritage and History in the U.S.](#)
A Teacher's Guide from EDSITEment offering a collection of lessons and resources for K-12 social studies, literature and arts classrooms that center around the experiences, achievements and perspectives of Asian Americans and Pacific Islanders across U.S. history.

Transfer Goal: Students will be able to independently use their understanding of evolutionary theory to explain the diversity of life, analyze evidence for change over time, and evaluate how scientific understanding of evolution informs decisions related to health, the environment, and society.

As aligned with LRHSD Long Term Learning Goal(s): <https://www.lrhsd.org/academics/curriculum>

1. design, critique, and carry out experiments in order to investigate scientific questions and/or propose solutions
2. collect, interpret, and analyze data in order to solve a defined problem
3. apply mathematics to express relationships efficiently and accurately
4. draw evidence-based conclusions from data in order to make informed decisions;
5. construct, interpret, and refine models (scientific and mathematical) to explain the physical and natural world
6. effectively communicate scientific ideas and evidence-based arguments to an appropriate audience through written and oral means
7. evaluate the validity of arguments that rely on scientific reasoning presented in the popular press and informational sources

Enduring Understandings

Students will understand that. . .

EU 1

- multiple lines of evidence—including fossils, DNA, and anatomical similarities—support common ancestry and the process of biological evolution. Evolution is driven by natural selection, variation, competition, and differential survival that lead to adaptation.

EU 2

- environmental change(s) and human activities can alter the genetic makeup and gene expression of populations and be a driving evolutionary force impacting ecosystems and lead to species adapting through natural selection, migration to more favorable

Essential Questions

- How does evidence from the past help us understand how life on Earth has changed over time and support the theory of evolution and common ancestry?
- How do mechanisms (such as genetic variation, natural selection, environmental factors, and human activity) drive the evolution of species, and how do they lead to both diversity and similarity among organisms?

environments, or species extinction if they cannot survive the new conditions.	
<u>Knowledge</u> Students will know . . . <i>EU 1</i> - the principles of evolution provide a scientific explanation for the history of the diversity of existing organisms. (LS4.A) (CCC1) - evolution is supported by fossil records, molecular and anatomical evidence. (LS4.A) - evolutionary evidence supports detail(s) about the sequence in which various lines of descent branched. (LS4.A) - natural selection operates on inherited traits, increasing the frequency of advantageous alleles. (LS4.B) - natural selection is based on ideas of variation, inheritance, excess reproduction and advantages of certain traits in certain environments. (LS4.B) <i>EU 2</i> - there are four requirements for natural selection to occur: (LS4.B) - the potential for species to increase in number - the heritable genetic variation of individuals in a species is due to mutation and sexual reproduction - competition for limited resources	<u>Skills</u> Students will be able to. . . <i>EU 1</i> - analyze multiple lines of evidence supporting evolution; explain evolution and natural selection using the four key evolutionary factors. (SEP4) - construct an explanation based on evidence for the appearance of a novel trait that arose in a given population. (SEP6) - provide a scientific explanation for the history of life on Earth using scientific evidence (e.g., fossil record, DNA, protein structures, etc.). (SEP2) (SEP8) - estimate how closely related species are, based on scientific evidence (e.g., anatomical similarities, similarities of DNA base and/or amino acid sequence). (SEP4) - use statistics or graphs to show how advantageous traits become more common. (SEP4) (CCC4) <i>EU 2</i> - identify and explain the four conditions of natural selection. (SEP8) - analyze data to determine how genetic variation, competition, and reproductive success contribute to natural selection.(SEP4) (CCC1) (CCC2) - construct explanations of how beneficial traits become more common in a population over time.(SEP6)

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| <ul style="list-style-type: none"> o the proliferation of those organisms that are better able to survive and reproduce in the environment • members of the same species can become reproductively isolated through geographic, behavioral, or genetic barriers within an environment, which may lead to the formation of a new species over time through the process of speciation. (LS4.C) • new traits may result from new combinations of existing genes or from mutations of genes in reproductive cells within a population. (LS4.B) • chance occurrences within an environment can contribute to the change(s) that occur over time within a population. (LS4.C) • if members cannot adjust to change that is too fast or drastic, the opportunity for species' evolution is lost • human activity (e.g., climate change, habitat destruction) can drastically impact biodiversity. (LS4.C) • earth's systems and life have co-evolved, shaping planetary and biological history. (LS4.A) (CCC1) • biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). (LS4.C) • species become extinct because they can no longer survive and reproduce in their altered environment.(LS4.C) (CCC2) | <ul style="list-style-type: none"> • use models or examples to show how isolation can result in the formation of a new species. (SEP6) • compare and contrast different types of reproductive isolation and their role in evolution.(SEP2) (CCC4) • predict the impact of genetic mutations on an organism's ability to survive and reproduce. (SEP1) • evaluate how a population responds to environmental changes based on the presence of adaptive traits. (SEP4) • construct arguments based on evidence about how human actions influence extinction and speciation rates.(SEP6) |
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Stage Two - Assessment

Performance Task:

Other Evidence:

- Tests
- Quizzes
- Evaluation of Data Collected by Experimentation
- Evaluation of Data from Prepared Prompts/Bioethics
- Evaluation of Data and Statistics
- Lab Reports
- Class Discussions
- Teacher-monitored Peer Tutoring

Stage Three - Instruction

Learning Plan: Suggested Learning Activities to Include Differentiated Instruction and Interdisciplinary Connections: Each learning activity listed must be accompanied by a learning goal of A= Acquiring basic knowledge and skills, M= Making meaning and/or a T= Transfer. {place A, M and/or T along with the applicable EU number in parentheses after each statement} All knowledge and skills must be addressed in this section with a corresponding lesson/activity which teaches each concept. The following color codes are used to notate activities that correspond with interdisciplinary connections and 21st Century Life & Career Connections (which involves Technology Literacy): *Red = Interdisciplinary Connection; Purple = 21st Century Life & Career Connection*

PHENOMENON – Darwin's Finches “Why do species survive, adapt or become extinct?”

- Watch video and analyze before and after data [Migration: 3.4 Natural selection in Darwin's finches | OpenLearn - Open University](#) (EU1,2 A)
 - Individual - Why Were The Finches Affected By The Drought Of 1977? How does this relate to how and why species survive, adapt, or become extinct?
 - Think-Pair-Share
 - FlowChart - Draw a flow chart or concept map to show what you think is happening to result in each situation. (survival, adaptation, extinction)
- Charles Darwin's theory of Natural Selection: evidence that the process of evolution primarily results from four factors: (EU2 A)
 - Potential for a species to increase in number
 - Heritable genetic variation of individuals in a species due to mutation and sexual reproduction
 - Competition for limited resources
 - Proliferation of those organisms that are better able to survive and reproduce in the environment.
- Survival of the fittest [The Origin of Species: The Beak of the Finch](#) (EU2 A/M)
- Lab activity: Use a virtual simulation to demonstrate species change of the peppered moth over time. The Peppered Moth ([Peppered Moth Game](#)) (EU2 M)
- Common descent ([Galapagos finches caught in act of becoming new species](#)) (EU2 A/M)
 - Revisit phenomenon
 - Small group discussions based on recent lessons:
 - What new information has been gained or investigated and needs to be added?
 - What aspects of the initial results were inaccurate or incorrect and why?

- Evidence of evolution ([Evolution of Darwin's finches and their beaks | ScienceDaily](#)) (EU1 A/M)
- Lab activity: Evolutionary comparison of how organisms, from simple to complex, have adapted to perform various life processes in their respective environments (EU1 M)
- Comparing Evolutionary Changes in Animals Lab ([Evidence of Evolution-Answers in gray Background When Charles Darwin first proposed the idea that all new species descend from a](#)) (EU1 M)
- Lab activity: Use virtual simulation to change the environment of a species to determine how it can survive. Natural Selection “Bird” Simulation [Natural Selection](#) (EU2 M)
- Lab activity: Use different tools and objects to analyze how features determine fitness. The Beak Lab (EU2 M)
- Lab activity: Use features of different species to design a cladogram to show evolutionary path of species. Evolution of Flight ([Flight Teacher's Guide](#)) (EU1 M)
- Lab activity: Students are given a fictitious environment and have to create a creature that can survive in it. (EU1,2 T)
- Return to Phenomenon (EU1,2 A/M/T)
 - Revisit Flowchart/Concept Map
 - Small group discussions based on recent lessons:
 - What aspects now appear to be missing?
 - What new concepts could be used to give a more detailed explanation?
 - Individual task: Revise to construct detailed final product.

Pacing Guide

<i>Unit #</i>	<i>Title of Unit</i>	<i>Approximate # of teaching days</i>
1	Ecosystems	60 days
2	Genetics and Heredity	45 days
3	Evolution	30 days

Instructional Materials

N/A

Accommodations

Special Education: The curriculum will be modified as per the Individualized Education Plan (IEP). Students will be accommodated based on specific accommodations listed in the IEP.

Students with 504 Plans: Students will be accommodated based on specific accommodations listed in the 504 Plan.

English Language Learners: Students will be accommodated based on individual need and in consultation with the ELL teacher.

Students at Risk of School Failure: Students will be accommodated based on individual need and provided various structural supports through their school.

Gifted and Talented Students: Students will be challenged to enhance their knowledge and skills through acceleration and additional independent research on the subject matter.