The following instructional plan is part of a GaDOE collection of Unit Frameworks, Performance Tasks, examples of Student Work, and Teacher Commentary. Many more GaDOE approved instructional plans are available by using the Search Standards feature located on GeorgiaStandards.Org.

Georgia Performance Standards Framework for Biology 9-12

Unit: Organization
Sternberg Task

The Evolution of the Theory of Evolution

Overview: In this task, students create a timeline based on research of the contributions of scientists to the theory of evolution at different points in history. This allows students to trace the history of the theory as well as discovering the types of evidence that support the theory of evolution and how new evidence can result in changes in accepted theory.

Standards (Content and Characteristics):

SB5.  Students will evaluate the role of natural selection in the development of the theory of evolution.
   a. Trace the history of the theory.
   c. Explain how fossil and biochemical evidence support the theory.

SCSh1. Students will evaluate the importance of curiosity, honesty, openness, and skepticism in science.
   a. Exhibit the above traits in their own scientific activities.
   b. Recognize that different explanations often can be given for the same evidence.
   c. Explain that further understanding of scientific problems relies on the design and execution of new experiments which may reinforce or weaken opposing explanations.

SCSh7. Students analyze how scientific knowledge is developed.
Students recognize that:
   a. The universe is a vast single system in which the basic principles are the same everywhere.
   b. Universal principles are discovered through observation and experimental verification.
   c. From time to time, major shifts occur in the scientific view of how the world works. More often, however, the changes that take place in the body of scientific knowledge are small modifications of prior knowledge. Major shifts in scientific views typically occur after the observation of a new phenomenon or an insightful interpretation of existing data by an individual or research group.
   d. Hypotheses often cause scientists to develop new experiments that produce additional data.
   e. Testing, revising, and occasionally rejecting new and old theories never ends.
SCSh8. **Students will understand important features of the process of scientific inquiry.**
Students will apply the following to inquiry learning practices:

   b. Scientific researchers are expected to critically assess the quality of data including possible sources of bias in their investigations’ hypotheses, observations, data analyses, and interpretations.
   c. Scientists use practices such as peer review and publication to reinforce the integrity of scientific activity and reporting.
   d. The merit of a new theory is judged by how well scientific data are explained by the new theory.
   e. The ultimate goal of science is to develop an understanding of the natural universe which is free of biases.

**Enduring Understandings:**

- The millions of different species of plants, animals, and microorganisms that live on earth today are related by descent from common ancestors.
- The great diversity of organisms is the result of more than 3.5 billion years of evolution that has filled every available niche with life forms.
- Modern classification systems are based upon biochemical and genetic evidence that indicates evolutionary relationships.
- Evolution explains the number of different life forms we see, similarities in anatomy and chemistry, and the sequence of changes in fossils formed over more than a billion years.
- Molecular evidence supports anatomical evidence from fossils about the sequence of descent.

**Essential Question(s):**

1. What evidence indicates evolution has occurred?
2. How has the evidence from evolution contributed to the organization of geologic time?
3. How does fossil and biochemical evidence support evolutionary theory?
4. How does the evidence of evolution contribute to modern classification systems?

**Pre Assessment:**

1. *Teacher note: Review the organization of geologic time with the students. Students need a basic understanding of the events of this time scale to grasp the basic premise on which the evolutionary theory is founded.*
2. Have students complete a The Truth About Evolution Quiz.
Outcome/Performance Level Expectations

- Describe the use of scientific evidence, such as the fossil record, in explaining the evolution of organisms
- Describe the development of the theory of evolution

Performance Task: (Detailed Description)

Development of the Evolutionary theory:
1. Students are assigned a scientist (see suggested_scientist_list) and are to research and create a presentation that includes the following pieces:
   - A photograph
   - The time period
   - The prevalent theory of evolution for that time period
   - A major world event of the time period
   - Evidence scientist used to develop his/her contribution (fossil or biochemical evidence)
   - Available technology for that time period
   - Dates of discovery
   - Publication
   - Acceptance of viewpoints
   - How his/her work contributed to the current theory of evolution
   - 3x5 “flash card” (scientist’s name on one side, important information as bullets on the other)

2. The entire class will construct a timeline with their information using the 3X5 flash card. Hang a piece of string along the wall and have the class hang their index card on the timeline in chronological order as they present information to their classmates. The information should be placed into a Graphic_Organizer so that all students have the necessary information.

   Teacher note: The students should not be assessed on dates. Rather, they should be assessed on their understanding of how the theory is modified as new evidence becomes available.

The Final Product

<table>
<thead>
<tr>
<th>Analytical</th>
<th>Practical</th>
<th>Creative</th>
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<tr>
<td>3. The “final product” , which will include all of the researched information on the scientist, should be in one of the following formats:</td>
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<td>3. The “final product” , which will include all of the researched information on the scientist, should be in one of the following formats:</td>
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| • WANTED  
• Advertising flyer for a speaking engagement/book signing  
4. Students will present their final product to the class.  

*Teacher note:*  
Teacher may have students place their 3x5 cards on the timeline at the time of their presentation and have audience students fill out their Graphic Organizer from the presentation.  
Teacher may then allow the entire class to complete “missing info” on graphic organizer from the timeline after all presentations are complete. | • Breaking news story  
• Newspaper article.  
• obituary  

4. Students will present their final product to the class.  

*Teacher note:*  
Teacher may have students place their 3x5 cards on the timeline at the time of their presentation and have audience students fill out their Graphic Organizer from the presentation.  
Teacher may then allow the entire class to complete “missing info” on graphic organizer from the timeline after all presentations are complete. | • A court case where 2 students argue their “client’s” case concerning whether they have legitimate and hard evidence to back up their theory.  
• A debate (that follows the debate protocol) between 2 scientists  

4. Students will present their final product to the class.  

*Teacher note:*  
Teacher may have students place their 3x5 cards on the timeline at the time of their presentation and have audience students fill out their Graphic Organizer from the presentation.  
Teacher may then allow the entire class to complete “missing info” on graphic organizer from the timeline after all presentations are complete. |

**Resources**  
unitedstreaming. 14 June 2007  
Early Theories of Evolution, [http://anthro.palomar.edu/evolve/default.htm](http://anthro.palomar.edu/evolve/default.htm)

Understanding Evolution, [http://evolution.berkeley.edu/](http://evolution.berkeley.edu/)


Web-geological time machine-interactive or text [http://www.ucmp.berkeley.edu/help/timeform.html](http://www.ucmp.berkeley.edu/help/timeform.html)

### Homework/Extension

<table>
<thead>
<tr>
<th>Homework/Extension</th>
<th>Write a personal reflection answering this question: Why is the theory of evolution such a controversial topic?</th>
<th>Write a personal reflection answering this question: Should teachers be allowed to teach controversial subjects? Why or why not?</th>
<th>Write a personal reflection answering this question: Continue the timeline and predict what evolutionary changes might occur in humans over the next 1,000 years.</th>
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### Instructional Tasks Accommodations for ELL Students

- Highlight differences on graphic organizer when a *theory is modified as new evidence becomes available*
- Modify language requirements for written assessments
- Pair with more advanced native language speaking partner (allow for translation in native language for comprehension), and have a study buddy walk with ELL student to read the scientists and their facts,
- Provide paragraph summary template (fill in the blank format)
- Provide bilingual support using word to word translation such as dictionaries, and glossaries

### Instructional Tasks Accommodations for Students with Disabilities

- **Review and Implement IEP accommodations for specific student needs**
- Other Accommodations may include
  - Copy of student notes in graphic organizer (if student with disabilities can’t write fast as they look at all names on timeline)
  - Sentence starters for homework writing
  - Highlight differences on graphic organizer when a *theory is modified as new evidence becomes available*
  - Create a word wall for vocabulary; word wall can be an interactive whereby students use yarn to make connections with key vocabulary
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<th><strong>Instructional Tasks</strong></th>
<th><strong>Accommodations for Gifted Students</strong></th>
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<tr>
<td>Include illustrations with the word wall</td>
<td>Allow students to act out the debate for the class reinforcing the how theories can be modified because of new evidence from each scientist</td>
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<td>Use KIM vocabulary strategy (Key word, Illustration, and Meaning student in students own words)</td>
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<td>Word banks for written assessments such as essays</td>
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Georgia Performance Standards Framework for Biology 9-12
The Truth about Evolution: Test yourself. True or False.

1. Humans come from monkeys. T or F
2. Only animals evolve. T or F
3. Evolution is theory not fact. T or F
4. The fossil record is complete. T or F
5. Species cannot evolve into other species. T or F

Suggested Scientists (teachers may want to include others that had an impact on the development of the theory of evolution):

William Bateson    Charles Lyell    George Buffon
Stanley Miller    Thomas Malthus    Charles Darwin
Lynn Margulis    Theodosius Dobzhansky    Ernst Mayr
Gregor Mendel    Desmond Morris    Alexander Oparin
Alfred Russell Wallace    Francesco Redi    George Simpson
G. Ledyard Stebbins    Harold Urey    John Ray
James Watson    Alfred Wegener    W. Weinberg
Francis Crick    Hugo de Vries    Niles Eldridge
Stephen Jay Gould    J.B.S. Haldane    G.H. Hardy
James Hutton    Jean Baptiste Lamarck    Carolous Linnaeus
### Graphic Organizer for Note taking The History of the Theory of Evolution

<table>
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<tr>
<th>Scientist</th>
<th>Date of Contribution</th>
<th>Summary of the Theory</th>
<th>Evidence Used in Support of or to Change Previous Theory</th>
<th>Historical Event</th>
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Georgia Department of Education  
Kathy Cox, State Superintendent of Schools  
Biology • 9-12 • Organization  
August 17, 2007 • Page 8 of 9  
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