**Davison Community Schools**
**ADVISORY CURRICULUM COUNCIL**
***Phase II, April 1, 2012***

## *Alterative Ed Applied Science*

**Course Essential Questions:**
1. How do you correctly solve and analyze ACT problems?
2. How do you make and diagram scale models?
3. How do scientists use microscopes in different fields of study/professions?
4. How do scientists use computers to model different ideas and concepts?
5. How are humans and different organisms alike and different anatomically?

## Unit 1: Answering ACT Questions

| Essential Questions: | Essential Understanding: |
|---|---|
| 1. How do you correctly analyze and solve ACT Science problems? | • Graph, Table and Diagram Interpretation are necessary skills required to take the ACT.<br>• Comparing and Contrasting scientific viewpoints requires that you read and understand each section. |

## Curriculum Standards

**Science:**

**S1.1 Scientific Inquiry**

Science is a way of understanding nature. Scientific research may begin by generating new scientific questions that can be answered through replicable scientific investigations that are logically developed and conducted systematically. Scientific conclusions and explanations result from careful analysis of empirical evidence and the use of logical reasoning. Some questions in science are addressed through indirect rather than direct observation, evaluating the consistency of new evidence with results predicted by models of natural processes. Results from investigations are communicated in reports that are scrutinized through a peer review process.

S1.1A Generate new questions that can be investigated in the laboratory or field.

S1.1B 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.

S1.1C 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).

S1.1D Identify patterns in data and relate them to theoretical models.

S1.1E Describe a reason for a given conclusion using evidence from an investigation.

S1.1f Predict what would happen if the variables, methods, or timing of an investigation were changed.

S1.1g Use empirical evidence to explain and critique the reasoning used to draw a scientific conclusion or explanation.

**S1.2 Scientific Reflection and Social Implications**

The integrity of the scientific process depends on scientists and citizens understanding and respecting the "nature of science." Openness to new ideas, skepticism, and honesty are attributes required for good scientific practice. Scientists must use logical reasoning during investigation design, analysis, conclusion, and communication. Science can produce critical insights on societal problems from a personal and local scale to a global scale. Science both aids in the development of technology and provides tools for assessing the costs, risks, and benefits of technological systems. Scientific conclusions and arguments play a role in personal choice and public policy decisions. New technology and scientific discoveries have had a major influence in shaping human history. Science and technology continue to offer diverse and

significant career opportunities.
S1.2A Critique whether or not specific questions can be answered through scientific investigations.
S1.2B Identify and critique arguments about personal or societal issues based on scientific evidence.
S1.2C Develop an understanding of a scientific concept by accessing information from multiple sources. Evaluate the scientific accuracy and significance of the information.
S1.2D Evaluate scientific explanations in a peer review process or discussion format.

Mathematical Practices:
**1 Make sense of problems and persevere in solving them.**
**4 Model with mathematics.**

| **Knowledge/Content**<br>Students will know about.... | **Skills/Processes**<br>Students will be able to..... |
|---|---|
| ▪ The components of the different graphs and tables<br>▪ The difference between dependent and independent variables<br>▪ The use of keys for interpretations of diagrams<br>▪ The reasons for pre-reading questions | ▪ Analyze and solve ACT style science questions<br>▪ Read and interpret graphs, diagrams, and tables<br>▪ Compare and contrast different scientific viewpoints. |

**Phase III Textbook/Materials**

**Phase IV Summative Assessment Evidence**

| **Common Summative Unit Assessments:** | **Agreed Upon Interim Summative Assessments:** (*identifies Performance Task) |
|---|---|

**Phase V Learning Plan**

## Unit 2: Creating and Diagramming Scale Models

| Essential Questions: | Essential Understanding: |
|---|---|
| 1. How do you make and diagram scale models? | • Careful measurement and accurate conversions are required to make scale models. |

### Curriculum Standards

Science:

S1.1C 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).

S1.2j Apply science principles or scientific data to anticipate effects of technological design decisions.

Math:

- *Analyze proportional relationships and use them to solve real-world and mathematical problems.*
  - 7.RP.1 : Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction (1/2)/(1/4) miles per hour, equivalently 2 miles per hour.
  - 7.RP.2 : Recognize and represent proportional relationships between quantities.
    a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
    b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
    c. Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as $t = pn$.
    d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.
  - 7.RP.3 : Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

| Knowledge/Content<br>Students will know about.... | Skills/Processes<br>Students will be able to..... |
|---|---|
| ▪ The steps to do metric and English conversions<br>▪ The difference between the metric prefixes<br>▪ The values of metric prefixes<br>▪ The use of graph paper for drawing scale models<br>▪ The components of a well built garage | ▪ Make metric conversions and metric/English conversions<br>▪ Draw scale models<br>▪ Construct models |

### Phase III Textbook/Materials

| Phase IV Summative Assessment Evidence | |
|---|---|
| **Common Summative Unit Assessments:** | **Agreed Upon Interim Summative Assessments:** (*identifies Performance Task |
| **Phase V Learning Plan** | |
| | |

## Unit 3: Microscope Use

| Essential Questions: | Essential Understanding: |
|---|---|
| 1. How do scientists use microscopes in different fields of study/professions? | • The microscope is a tool that is used in many fields of science. |

## Curriculum Standards

**Science:**

**1.2A** Critique whether or not specific questions can be answered through scientific investigations.

**1.2B** Identify and critique arguments about personal or societal issues based on scientific evidence.

**1.2C** Develop an understanding of a scientific concept by accessing information from multiple sources. Evaluate the scientific accuracy and significance of the information.

**1.2D** Evaluate scientific explanations in a peer review process or discussion format.

**1.2E** Evaluate the future career and occupational prospects of science fields.

**CTE:**

**Content Standard 4: All students will employ a systematic approach to technological solutions by using resources and processes to create, maintain and improve products, systems, and environments.**

7. Apply a systematic approach to design solutions to technological problems using investigation, analysis and idea development, proposals, planning, making a prototype of the solution, testing and evaluation of the prototype, and self assessment.

**Content Standard 2: All students will use technologies to input, retrieve, organize, manipulate, evaluate, and communicate information.**

2. Given a scenario, develop multiple options and present the solutions using a variety of technologies.

| Knowledge/Content<br>Students will know about.... | Skills/Processes<br>Students will be able to..... |
|---|---|
| ▪ The components of a microscopes<br>▪ The magnification of the different lenses<br>▪ The purposes of each of the knobs<br>▪ The different parts of a microscope slide<br>▪ The use of water when preparing a slide<br>▪ The different ways microscopes are used in different fields of science | ▪ Use a light microscope properly<br>▪ Determine magnification of slides<br>▪ Make their own microscope slides<br>▪ Identify and describe the different ways microscopes are used in different fields of science |

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|---|---|

## Phase V Learning Plan

## Unit 4: Computer Aided Design and Models

| Essential Questions: | Essential Understanding: |
|---|---|
| 1. How do scientists use computers to model different ideas and concepts? | • Using simple modeling software allows different scientists the ability to convey complex understandings. |

### Curriculum Standards

**Science**

**1.2C** Develop an understanding of a scientific concept by accessing information from multiple sources. Evaluate the scientific accuracy and significance of the information.

**CTE:**

**Content Standard 4: All students will employ a systematic approach to technological solutions by using resources and processes to create, maintain and improve products, systems, and environments.**

7. Apply a systematic approach to design solutions to technological problems using investigation, analysis and idea development, proposals, planning, making a prototype of the solution, testing and evaluation of the prototype, and self assessment.

**Content Standard 2: All students will use technologies to input, retrieve, organize, manipulate, evaluate, and communicate information.**

2. Given a scenario, develop multiple options and present the solutions using a variety of technologies.

| Knowledge/Content<br>Students will know about.... | Skills/Processes<br>Students will be able to..... |
|---|---|
| ▪ The different functions of Microsoft Draw Software<br>▪ The purpose of drawing models<br>▪ The components of a scale model<br>▪ The use of models to represent ideas or concepts in different areas of science | ▪ Use computer drawing programs<br>▪ Draw scale models<br>▪ Construct models of many every day and science related objects |

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|---|---|

### Phase V Learning Plan

## Unit 5: Comparative Anatomy

| Essential Questions: | Essential Understanding: |
|---|---|
| 1. How are humans and different organisms alike and different anatomically? | • Organ systems have developed to maintain homeostasis.<br>• Different organisms have different adaptations due to their environments.<br>• Organisms share some adaptations because of similar functional requirements. |

## Curriculum Standards

**Science**

**S1.2C** Develop an understanding of a scientific concept by accessing information from multiple sources. Evaluate the scientific accuracy and significance of the information.

**S2.3d** Identify the general functions of the major systems of the human body (digestion, respiration, reproduction, circulation, excretion, protection from disease, and movement, control, and coordination) and describe ways that these systems interact with each other.

**S2.3e** Describe how human body systems maintain relatively constant internal conditions (temperature, acidity, and blood sugar).

**S2.3f** Explain how human organ systems help maintain human health.

**S2.3g** Compare the structure and function of a human body system or subsystem to a nonliving system (e.g., human joints to hinges, enzyme and substrate to interlocking puzzle pieces).

**S2.5B** Explain how major systems and processes work together in animals and plants, including relationships between organelles, cells, tissues, organs, organ systems, and organisms. Relate these to molecular functions.

**CTE:**

**Content Standard 4: All students will employ a systematic approach to technological solutions by using resources and processes to create, maintain and improve products, systems, and environments.**

7. Apply a systematic approach to design solutions to technological problems using investigation, analysis and idea development, proposals, planning, making a prototype of the solution, testing and evaluation of the prototype, and self assessment.

**Content Standard 2: All students will use technologies to input, retrieve, organize, manipulate, evaluate, and communicate information.**

2. Given a scenario, develop multiple options and present the solutions using a variety of technologies

| Knowledge/Content<br>Students will know about.... | Skills/Processes<br>Students will be able to..... |
|---|---|
| ▪ The meaning of different anatomical terms<br>▪ The different organ systems and their functions<br>  o Cardiovascular<br>  o Respiratory<br>  o Excretory<br>  o Digestive | ▪ Use the internet to perform dissections online<br>▪ Fill out worksheets to guide them in their dissections<br>▪ Identify the major body systems and their functions<br>▪ Identify the major organs of the Cardiovascular, Respiratory, Excretory, Digestive and Reproductive Systems |

| | |
|---|---|
| ○ Reproductive Systems<br>▪ The roles of the organs in the different organisms<br>▪ The difference between cold blooded and warm blooded animals<br>▪ The difference between mammals and amphibians | ▪ Describe the functions of the Cardiovascular, Respiratory, Excretory, Digestive and Reproductive Systems<br>▪ Compare and contrast the frog, pig and human anatomy and function |
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| | |
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