

Curriculum Crosswalk

This crosswalk is intended to show many of the possible connections between the *Rx for Science Literacy* manual and the standards across many of the curricula areas taught in the state of North Carolina. This manual contains many lessons that strengthen the knowledge of biomedical research. The lessons in this manual may be taught sequentially or independently. The materials provided in the manual are the basis for the lessons. Teachers are expected to make the necessary adjustments to these lesson plans to meet the needs of their students.

Unit I-Chapter 1 What is Science?

Next Generation Science Standards

- **MS-ESS3-3.** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
 - **MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
 - **MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
 - **MS-ETS1-3.** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
 - **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
 - **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
 - **HS-ESS3-1.** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
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North Carolina Essential Standards for Science

- Science as Inquiry
 - **7.L.1** Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life.
 - **7.L.2** Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring.
 - **8.L.1** Understand the hazards caused by agents of diseases that affect living organisms.
 - **8.L.2** Understand how biotechnology is used to affect living organisms.
 - **Bio.2.2** Understand the impact of human activities on the environment (one generation affects the next).
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Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

- Writing Standards Text Types and Purposes 1 for Kindergarten to Twelfth grade
- Speaking and Listening Standards Comprehension and Collaboration 1, 2 and 3 for Kindergarten to Twelfth grade

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- Speaking and Listening Standards Presentation of Knowledge and Ideas 4, 5 and 6 for Kindergarten to Twelfth grade

North Carolina Essential Standards for Social Studies

- **6.H.2** Understand the political, economic and/or social significance of historical events, issues, individuals and cultural groups.
- **7.H.2** Understand the implications of global interactions.

Career and Technical Education VoCATS Course Blueprint Competencies

- Exploring Biotechnology
 - » **EB04.01** Discuss the nature of science, scientific inquiry and problem solving.
- Biomedical Technology
 - » **BT09.00** Evaluate careers and techniques that use biomedical technology.

Unit I-Chapter 2 **What is Biomedical Research?**

Next Generation Science Standards

- **MS-LS1-3.** Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
- **MS-ESS3-3.** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
- **MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- **MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- **MS-ETS1-3.** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
- **HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
- **HS-LS1-2.** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
- **HS-LS1-3.** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
- **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- **HS-LS3-1.** Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

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- **HS-ESS3-1.** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
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North Carolina Essential Standards for Science

- Science as Inquiry
 - **3.L.1** Understand human body systems and how they are essential for life: protection, movement and support.
 - **5.L.1** Understand how structures and systems of organisms (to include the human body) perform functions necessary for life.
 - **7.L.1** Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life.
 - **7.L.2** Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring.
 - **8.L.1** Understand the hazards caused by agents of diseases that affect living organisms.
 - **8.L.2** Understand how biotechnology is used to affect living organisms.
 - **Bio.2.2** Understand the impact of human activities on the environment (one generation affects the next).
 - **Bio.3.2** Understand how the environment, and/or the interaction of alleles, influences the expression of genetic traits.
 - **Bio.3.3** Understand the application of DNA technology.
 - **Bio.4.1** Understand how biological molecules are essential to the survival of living organisms.
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Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

- Reading Standards for Informational Text 1, 2, 3 and 4 for Third grade to Twelfth grade
 - Writing Standards Text Types and Purposes 1 for Kindergarten to Twelfth grade
 - Speaking and Listening Standards Comprehension and Collaboration 1, 2 and 3 for Kindergarten to Twelfth grade
 - Speaking and Listening Standards Presentation of Knowledge and Ideas 4, 5 and 6 for Kindergarten to Twelfth grade
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North Carolina Essential Standards for Social Studies

- **6.H.2** Understand the political, economic and/or social significance of historical events, issues, individuals and cultural groups.
 - **7.H.2** Understand the implications of global interactions.
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Career and Technical Education VoCATS Course Blueprint Competencies

- Exploring Biotechnology
 - » **EB04.01** Discuss the nature of science, scientific inquiry and problem solving.
 - » **EB08.00** Analyze biomedical research methods.
 - » **EB09.00** Analyze ethical and professional standards in health care and biotechnology.
 - » **EB10.00** Analyze careers in biotechnology, bioinformatics, biomanufacturing, agriculture and health care.

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- Biomedical Technology
 - » **BT10.00** Analyze biomedical research.
 - » **BT11.00** Analyze challenges to biomedical research.
 - Biotechnology and Agriscience Research II
 - » **BB11.0** Examine biological processes in animal science related to biotechnology.
 - Health Science II
 - » **3.04** Understand biotechnology research and development.
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Unit I-Chapter 3 Biomedical Research Methods

Next Generation Science Standards

- **MS-LS1-3.** Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
- **MS-ESS3-3.** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
- **MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- **MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- **MS-ETS1-3.** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
- **HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
- **HS-LS1-2.** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
- **HS-LS1-3.** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
- **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- **HS-LS3-1.** Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
- **HS-ESS3-1.** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
- **HS-ESS3-3.** Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
- **HS-ESS3-4.** Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

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North Carolina Essential Standards for Science

- Science as Inquiry
 - **7.L.1** Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life.
 - **7.L.2** Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring.
 - **8.L.1** Understand the hazards caused by agents of diseases that affect living organisms.
 - **8.L.2** Understand how biotechnology is used to affect living organisms.
 - **Bio.2.2** Understand the impact of human activities on the environment (one generation affects the next).
 - **Bio.3.2** Understand how the environment, and/or the interaction of alleles, influences the expression of genetic traits.
 - **Bio.3.3** Understand the application of DNA technology.
 - **Bio.4.1** Understand how biological molecules are essential to the survival of living organisms.
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Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

- Reading Standards for Informational Text 1, 2, 3 and 4 for Third grade to Twelfth grade
 - Speaking and Listening Standards Comprehension and Collaboration 1, 2 and 3 for Kindergarten to Twelfth grade
 - Speaking and Listening Standards Presentation of Knowledge and Ideas 4, 5 and 6 for Kindergarten to Twelfth grade
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North Carolina Essential Standards for Social Studies

- **6.H.2** Understand the political, economic and/or social significance of historical events, issues, individuals and cultural groups.
 - **7.H.2** Understand the implications of global interactions.
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Career and Technical Education VoCATS Course Blueprint Competencies

- Exploring Biotechnology
 - » **EB04.01** Discuss the nature of science, scientific inquiry and problem solving.
 - » **EB08.00** Analyze biomedical research methods.
- Biomedical Technology
 - » **BT06.00** Analyze issues of public health, infectious diseases and bioterrorism.
 - » **BT10.00** Analyze biomedical research.
 - » **BT11.00** Analyze challenges to biomedical research.
- Biotechnology and Agriscience Research II
 - » **BB11.0** Examine biological processes in animal science related to biotechnology.
 - » **BB12.0** Perform biotechnology protocol related to animal science.
- Health Science II
 - » **3.04** Understand biotechnology research and development.

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Unit I-Chapter 4 Benefits of Biomedical Research

Next Generation Science Standards

- **MS-LS1-3.** Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
 - **MS-ESS3-3.** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
 - **MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
 - **MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
 - **MS-ETS1-3.** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
 - **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
 - **HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
 - **HS-LS1-2.** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
 - **HS-LS1-3.** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
 - **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
 - **HS-LS3-1.** Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
 - **HS-ESS3-1.** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
 - **HS-ESS3-3.** Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
 - **HS-ESS3-4.** Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
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North Carolina Essential Standards for Science

- Science as Inquiry
- **7.L.1** Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life.
- **7.L.2** Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring.
- **8.L.1** Understand the hazards caused by agents of diseases that affect living organisms.
- **8.L.2** Understand how biotechnology is used to affect living organisms.

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- **Bio.2.2** Understand the impact of human activities on the environment (one generation affects the next).
 - **Bio.3.2** Understand how the environment, and/or the interaction of alleles, influences the expression of genetic traits.
 - **Bio.3.3** Understand the application of DNA technology.
 - **Bio.4.1** Understand how biological molecules are essential to the survival of living organisms.
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Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

- Reading Standards for Informational Text 1, 2, 3 and 4 for Third grade to Twelfth grade
 - Speaking and Listening Standards Comprehension and Collaboration 1, 2 and 3 for Kindergarten to Twelfth grade
 - Speaking and Listening Standards Presentation of Knowledge and Ideas 4, 5 and 6 for Kindergarten to Twelfth grade
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North Carolina Essential Standards for Social Studies

- **6.H.2** Understand the political, economic and/or social significance of historical events, issues, individuals and cultural groups.
 - **7.H.2** Understand the implications of global interactions.
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Common Core State Standards for Mathematics

- **8.SP** Statistics and Probability
 - **S-ID** Interpreting Categorical and Quantitative Data
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Career and Technical Education VoCATS Course Blueprint Competencies

- Exploring Biotechnology
 - » **EB06.00** Analyze biotechnology in health care.
 - » **EB08.00** Analyze biomedical research methods.
- Biomedical Technology
 - » **BT10.00** Analyze biomedical research.
 - » **BT11.00** Analyze challenges to biomedical research.
- Biotechnology and Agriscience Research II
 - » **BB11.0** Examine biological processes in animal science related to biotechnology.
 - » **BB12.0** Perform biotechnology protocol related to animal science.
- Health Science II
 - » **3.04** Understand biotechnology research and development.

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Unit II-Chapter 1 Student Surveys

Next Generation Science Standards

- **5-LS2-1.** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
 - **MS-ESS3-3.** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
 - **MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
 - **MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
 - **MS-ETS1-3.** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
 - **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
 - **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
 - **HS-ESS3-1.** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
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North Carolina Essential Standards for Science

- Science as Inquiry
 - **5.L.2** Understand the interdependence of plants and animals with their ecosystem.
 - **8.L.2** Understand how biotechnology is used to affect living organisms.
 - **Bio.2.2** Understand the impact of human activities on the environment (one generation affects the next).
 - **Bio.3.3** Understanding the application of DNA technology.
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Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

- Reading Standards for Informational Text 7, 8 and 9 for Sixth grade to Twelfth grade
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Common Core State Standards for Mathematics

- **8.SP** Statistics and Probability
 - **S-ID** Interpreting Categorical and Quantitative Data
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Career and Technical Education VoCATS Course Blueprint Competencies

- Exploring Biotechnology
 - » **EB08.00** Analyze biomedical research methods.
 - » **EB09.00** Analyze ethical and professional standards in health care and biotechnology.

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- Biomedical Technology
 - » **BT02.00** Analyze biomedical ethics and legal principles.
 - » **BT11.00** Analyze challenges to biomedical research.
 - Biotechnology and Agriscience Research II
 - » **BB16.0** Discuss ethical and practical issues surrounding biotechnology.
 - Health Science II
 - » **3.04** Understand biotechnology research and development.
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Unit II-Chapter 2 Why Use Animals?

Next Generation Science Standards

- **5-LS2-1.** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
 - **MS-ESS3-3.** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
 - **MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
 - **MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
 - **MS-ETS1-3.** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
 - **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
 - **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
 - **HS-ESS3-1.** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
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North Carolina Essential Standards for Science

- Science as Inquiry
- **5.L.2** Understand the interdependence of plants and animals with their ecosystem.
- **7.L.1** Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life.
- **7.L.2** Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring.
- **8.L.2** Understand how biotechnology is used to affect living organisms.
- **Bio.2.2** Understand the impact of human activities on the environment (one generation affects the next).

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Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

- Reading Standards for Informational Text 1, 2, 3 and 4 for Third grade to Twelfth grade
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Career and Technical Education VoCATS Course Blueprint Competencies

- Exploring Biotechnology
 - » **EB08.00** Analyze biomedical research methods.
 - » **EB09.00** Analyze ethical and professional standards in health care and biotechnology.
 - Biomedical Technology
 - » **BT02.00** Analyze biomedical ethics and legal principles.
 - » **BT10.00** Analyze biomedical research.
 - » **BT11.00** Analyze challenges to biomedical research.
 - Biotechnology and Agriscience Research II
 - » **BB16.0** Discuss ethical and practical issues surrounding biotechnology.
 - Health Science II
 - » **3.04** Understand biotechnology research and development.
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Unit II-Chapter 3 Advances Based on Animal Research

Next Generation Science Standards

- **5-LS2-1.** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
 - **MS-ESS3-3.** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
 - **MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
 - **MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
 - **MS-ETS1-3.** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
 - **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
 - **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
 - **HS-ESS3-1.** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
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North Carolina Essential Standards for Science

- Science as Inquiry
- **5.L.2** Understand the interdependence of plants and animals with their ecosystem.

Curriculum Crosswalk

- **7.L.1** Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life.
- **7.L.2** Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring.
- **8.L.2** Understand how biotechnology is used to affect living organisms.
- **Bio.2.2** Understand the impact of human activities on the environment (one generation affects the next).

Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

- Reading Standards for Informational Text 1, 2, 3 and 4 for Fourth grade to Twelfth grade

Career and Technical Education VoCATS Course Blueprint Competencies

- Exploring Biotechnology
 - » **EB08.00** Analyze biomedical research methods.
 - » **EB09.00** Analyze ethical and professional standards in health care and biotechnology.
- Biomedical Technology
 - » **BT02.00** Analyze biomedical ethics and legal principles.
 - » **BT10.00** Analyze biomedical research.
 - » **BT11.00** Analyze challenges to biomedical research.
- Biotechnology and Agriscience Research II
 - » **BB16.0** Discuss ethical and practical issues surrounding biotechnology.
- Health Science II
 - » **3.04** Understand biotechnology research and development.

Unit II-Chapter 4 Number and Species of Animals Used

Next Generation Science Standards

- **5-LS2-1.** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
- **MS-ESS3-3.** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
- **MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- **MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- **MS-ETS1-3.** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Curriculum Crosswalk

- **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
 - **HS-ESS3-1.** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
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North Carolina Essential Standards for Science

- Science as Inquiry
 - **5.L.2** Understand the interdependence of plants and animals with their ecosystem.
 - **7.L.1** Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life.
 - **7.L.2** Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring.
 - **8.L.2** Understand how biotechnology is used to affect living organisms.
 - **Bio.2.2** Understand the impact of human activities on the environment (one generation affects the next).
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Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

- Reading Standards for Informational Text 1, 2, 3 and 4 for Fourth grade to Twelfth grade
 - Speaking and Listening Standards Comprehension and Collaboration 1, 2 and 3 for Fourth grade to Twelfth grade
 - Speaking and Listening Standards Presentation of Knowledge and Ideas 4, 5 and 6 for Fourth grade to Twelfth grade
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Career and Technical Education VoCATS Course Blueprint Competencies

- Exploring Biotechnology
 - » **EB08.00** Analyze biomedical research methods.
 - » **EB09.00** Analyze ethical and professional standards in health care and biotechnology.
- Biomedical Technology
 - » **BT02.00** Analyze biomedical ethics and legal principles.
 - » **BT10.00** Analyze biomedical research.
 - » **BT11.00** Analyze challenges to biomedical research.
- Biotechnology and Agriscience Research II
 - » **BB16.0** Discuss ethical and practical issues surrounding biotechnology.
- Health Science II
 - » **3.04** Understand biotechnology research and development.

Curriculum Crosswalk

Unit II-Chapter 5 Care of Research Animals

Next Generation Science Standards

- **5-LS2-1.** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
 - **MS-ESS3-3.** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
 - **MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
 - **MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
 - **MS-ETS1-3.** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
 - **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
 - **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
 - **HS-ESS3-1.** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
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North Carolina Essential Standards for Science

- Science as Inquiry
 - **5.L.2** Understand the interdependence of plants and animals with their ecosystem.
 - **7.L.1** Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life.
 - **7.L.2** Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring.
 - **8.L.2** Understand how biotechnology is used to affect living organisms.
 - **Bio.2.2** Understand the impact of human activities on the environment (one generation affects the next).
 - **Bio.3.3** Understand the application of DNA technology.
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Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

- Reading Standards for Informational Text 1, 2, 3 and 4 for Ninth grade to Twelfth grade
- Speaking and Listening Standards Comprehension and Collaboration 1, 2 and 3 for Ninth grade to Twelfth grade
- Speaking and Listening Standards Presentation of Knowledge and Ideas 4, 5 and 6 for Ninth grade to Twelfth grade

Curriculum Crosswalk

Career and Technical Education VoCATS Course Blueprint Competencies

- Exploring Biotechnology
 - » **EB08.00** Analyze biomedical research methods.
 - » **EB09.00** Analyze ethical and professional standards in health care and biotechnology.
 - Biomedical Technology
 - » **BT02.00** Analyze biomedical ethics and legal principles.
 - » **BT10.00** Analyze biomedical research.
 - » **BT11.00** Analyze challenges to biomedical research.
 - Biotechnology and Agriscience Research II
 - » **BB16.0** Discuss ethical and practical issues surrounding biotechnology.
 - Health Science II
 - » **3.04** Understand biotechnology research and development.
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Unit III-Chapter 1 Critical Thinking

Next Generation Science Standards

- **5-LS2-1.** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
- **MS-LS1-3.** Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
- **MS-LS1-4.** Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
- **MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- **MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- **MS-ETS1-3.** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
- **HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
- **HS-LS1-6.** Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.
- **HS-LS1-7.** Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.

Curriculum Crosswalk

- **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- **HS-LS3-1.** Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
- **HS-ESS3-1.** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

North Carolina Essential Standards for Science

- Science as Inquiry
- **5.L.2** Understand the interdependence of plants and animals with their ecosystem.
- **7.L.1** Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life.
- **7.L.2** Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring.
- **8.L.2** Understand how biotechnology is used to affect living organisms.
- **Bio.1.1** Understand the relationship between the structures of cells and their organelles.
- **Bio.3.1** Explain how traits are determined by the structure and function DNA.
- **Bio.3.2** Understand how the environment, and/or the interaction of alleles, influences the expression of genetic traits.
- **Bio.3.3** Understand the application of DNA technology.
- **Bio.4.1** Understand how biological molecules are essential to the survival of living organisms.

Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

- Speaking and Listening Standards Comprehension and Collaboration 1, 2 and 3 for Fifth grade to Twelfth grade
- Speaking and Listening Standards Presentation of Knowledge and Ideas 4, 5 and 6 for Fifth grade to Twelfth grade

Career and Technical Education VoCATS Course Blueprint Competencies

- Exploring Biotechnology
 - » **EB01.00** Analyze basic concepts and historical development of biotechnology.
 - » **EB08.00** Analyze biomedical research methods.
- Biomedical Technology
 - » **BT10.00** Analyze biomedical research.
 - » **BT11.00** Analyze challenges to biomedical research.
- Biotechnology and Agriscience Research II
 - » **BB16.0** Discuss ethical and practical issues surrounding biotechnology.
- Health Science II
 - » **3.04** Understand biotechnology research and development.

Curriculum Crosswalk

Unit III-Chapter 2

Animal Research: Issues and Answers

Next Generation Science Standards

- **HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
 - **HS-LS1-6.** Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.
 - **HS-LS1-7.** Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.
 - **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
 - **HS-LS3-1.** Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
 - **HS-ESS3-1.** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.
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North Carolina Essential Standards for Science

- **Bio.1.1** Understand the relationship between the structures of cells and their organelles.
 - **Bio.3.1** Explain how traits are determined by the structure and function DNA.
 - **Bio.3.2** Understand how the environment, and/or the interaction of alleles, influences the expression of genetic traits.
 - **Bio.3.3** Understand the application of DNA technology.
 - **Bio.4.1** Understand how biological molecules are essential to the survival of living organisms.
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Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

- Reading Standards for Informational Text 1, 2, 3 and 4 for Ninth grade to Twelfth grade
 - Speaking and Listening Standards Comprehension and Collaboration 1, 2 and 3 for Ninth grade to Twelfth grade
 - Speaking and Listening Standards Presentation of Knowledge and Ideas 4, 5 and 6 for Ninth grade to Twelfth grade
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Career and Technical Education VoCATS Course Blueprint Competencies

- Exploring Biotechnology
 - » **EB08.00** Analyze biomedical research methods.
- Biomedical Technology
 - » **BT02.00** Analyze biomedical ethics and legal principles.
 - » **BT10.00** Analyze biomedical research.
 - » **BT11.00** Analyze challenges to biomedical research.

Curriculum Crosswalk

- Biotechnology and Agriscience Research II
 - » **BB16.0** Discuss ethical and practical issues surrounding biotechnology.
- Health Science II
 - » **3.04** Understand biotechnology research and development.

Unit III-Chapter 3 Transgenic Animals

Next Generation Science Standards

- **HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
- **HS-LS1-6.** Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.
- **HS-LS1-7.** Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.
- **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- **HS-LS3-1.** Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
- **HS-ESS3-1.** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

North Carolina Essential Standards for Science

- **8.L.2** Understand how biotechnology is used to affect living organisms.
- **Bio.1.1** Understand the relationship between the structures of cells and their organelles.
- **Bio.3.1** Explain how traits are determined by the structure and function DNA.
- **Bio.3.2** Understand how the environment, and/or the interaction of alleles, influences the expression of genetic traits.
- **Bio.3.3** Understand the application of DNA technology.
- **Bio.4.1** Understand how biological molecules are essential to the survival of living organisms.

Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

- Reading Standards for Informational Text 1, 2, 3 and 4 for Ninth grade to Twelfth grade
- Speaking and Listening Standards Comprehension and Collaboration 1, 2 and 3 for Ninth grade to Twelfth grade
- Speaking and Listening Standards Presentation of Knowledge and Ideas 4, 5 and 6 for Ninth grade to Twelfth grade

Curriculum Crosswalk

Career and Technical Education VoCATS Course Blueprint Competencies

- Exploring Biotechnology
 - » **EB08.00** Analyze biomedical research methods.
 - » **EB09.00** Analyze ethical and professional standards in health care and biotechnology.
- Biomedical Technology
 - » **BT02.00** Analyze biomedical ethics and legal principles.
 - » **BT10.00** Analyze biomedical research.
 - » **BT11.00** Analyze challenges to biomedical research.
- Biotechnology and Agriscience Research I
 - » **BA11.00** Analyze the impact of cells on the formation and function of living organisms.
 - » **BA12.00** Explore concepts of Mendelian genetics and inheritance related to plant and animal breeding.
- Biotechnology and Agriscience Research II
 - » **BB07.0** Outline the development of genetically modified organisms (GMOs).
 - » **BB08.0** Examine the various methods of genetic manipulation in plant and animal cells.
 - » **BB16.0** Discuss ethical and practical issues surrounding biotechnology.
- Health Science II
 - » **3.04** Understand biotechnology research and development.

Unit III-Chapter 4

Therapeutic vs. Reproductive Cloning: Scientific Realities, Public Controversy

Next Generation Science Standards

- **HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
- **HS-LS1-6.** Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.
- **HS-LS1-7.** Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.
- **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- **HS-LS3-1.** Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
- **HS-ESS3-1.** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

North Carolina Essential Standards for Science

- **Bio.1.1** Understand the relationship between the structures of cells and their organelles.
- **Bio.3.1** Explain how traits are determined by the structure and function DNA.

Curriculum Crosswalk

- **Bio.3.2** Understand how the environment, and/or the interaction of alleles, influences the expression of genetic traits.
- **Bio.3.3** Understand the application of DNA technology.
- **Bio.4.1** Understand how biological molecules are essential to the survival of living organisms.

Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

- Reading Standards for Informational Text 1, 2, 3 and 4 for Ninth grade to Twelfth grade
- Speaking and Listening Standards Comprehension and Collaboration 1, 2 and 3 for Ninth grade to Twelfth grade
- Speaking and Listening Standards Presentation of Knowledge and Ideas 4, 5 and 6 for Ninth grade to Twelfth grade

Career and Technical Education VoCATS Course Blueprint Competencies

- Exploring Biotechnology
 - » **EB08.00** Analyze biomedical research methods.
 - » **EB09.00** Analyze ethical and professional standards in health care and biotechnology.
- Biomedical Technology
 - » **BT02.00** Analyze biomedical ethics and legal principles.
 - » **BT10.00** Analyze biomedical research.
 - » **BT11.00** Analyze challenges to biomedical research.
- Biotechnology and Agriscience Research I
 - » **BA11.00** Analyze the impact of cells on the formation and function of living organisms.
 - » **BA12.00** Explore concepts of Mendelian genetics and inheritance related to plant and animal breeding.
- Biotechnology and Agriscience Research II
 - » **BB08.0** Examine the various methods of genetic manipulation in plant and animal cells.
 - » **BB11.0** Examine biological processes in animal science related to biotechnology.
 - » **BB12.0** Perform biotechnology protocol related to animal science.
 - » **BB16.0** Discuss ethical and practical issues surrounding biotechnology.
- Health Science II
 - » **3.04** Understand biotechnology research and development.

Unit IV-Chapter 1 Careers in the Biosciences

Next Generation Science Standards

- **MS-LS1-3.** Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
- **MS-LS1-4.** Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

Curriculum Crosswalk

- **MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- **MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- **MS-ETS1-3.** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
- **HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
- **HS-LS1-6.** Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.
- **HS-LS1-7.** Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.
- **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- **HS-LS3-1.** Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
- **HS-ESS3-1.** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

North Carolina Essential Standards for Science

- Science as Inquiry
- **7.L.1** Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life.
- **7.L.2** Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring.
- **8.L.2** Understand how biotechnology is used to affect living organisms.
- **Bio.1.1** Understand the relationship between the structures of cells and their organelles.
- **Bio.3.1** Explain how traits are determined by the structure and function DNA.
- **Bio.3.2** Understand how the environment, and/or the interaction of alleles, influences the expression of genetic traits.
- **Bio.3.3** Understand the application of DNA technology.
- **Bio.4.1** Understand how biological molecules are essential to the survival of living organisms.

Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

- Reading Standards for Informational Text 1, 2, 3 and 4 for Third grade to Twelfth grade
- Writing Standards Text Types and Purposes 1 for Third grade to Twelfth grade

Curriculum Crosswalk

- Speaking and Listening Standards Comprehension and Collaboration 1, 2 and 3 for Third grade to Twelfth grade
- Speaking and Listening Standards Presentation of Knowledge and Ideas 4, 5 and 6 for Third grade to Twelfth grade

Career and Technical Education VoCATS Course Blueprint Competencies

- Exploring Biotechnology
 - » **EB10.00** Analyze careers in biotechnology, bioinformatics, biomanufacturing, agriculture and health care.
- Biomedical Technology
 - » **BT09.00** Evaluate careers and techniques that use biomedical technology.
- Biotechnology and Agriscience Research I
 - » **BA04.00** Discuss the skills needed for careers in the biotechnology industry.
- Biotechnology and Agriscience Research II
 - » **BB16.0** Discuss ethical and practical issues surrounding biotechnology.
- Health Science II
 - » **3.04** Understand biotechnology research and development.

Unit IV-Chapter 2 Genetics Primer

Next Generation Science Standards

- **MS-LS1-3.** Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
- **MS-LS1-4.** Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
- **MS-ETS1-1.** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- **MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- **MS-ETS1-3.** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- **MS-ETS1-4.** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
- **HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
- **HS-LS1-6.** Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

Curriculum Crosswalk

- **HS-LS1-7.** Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.
- **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- **HS-LS3-1.** Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
- **HS-ESS3-1.** Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

North Carolina Essential Standards for Science

- **7.L.1** Understand the processes, structures and functions of living organisms that enable them to survive, reproduce and carry out the basic functions of life.
- **7.L.2** Understand the relationship of the mechanisms of cellular reproduction, patterns of inheritance and external factors to potential variation among offspring.
- **8.L.2** Understand how biotechnology is used to affect living organisms.
- **Bio.1.1** Understand the relationship between the structures of cells and their organelles.
- **Bio.3.1** Explain how traits are determined by the structure and function DNA.
- **Bio.3.2** Understand how the environment, and/or the interaction of alleles, influences the expression of genetic traits.
- **Bio.3.3** Understand the application of DNA technology.
- **Bio.4.1** Understand how biological molecules are essential to the survival of living organisms.

Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects

- Reading Standards for Informational Text 1, 2, 3 and 4 for Ninth grade to Twelfth grade
- Speaking and Listening Standards Comprehension and Collaboration 1, 2 and 3 for Ninth grade to Twelfth grade
- Speaking and Listening Standards Presentation of Knowledge and Ideas 4, 5 and 6 for Ninth grade to Twelfth grade

Career and Technical Education VoCATS Course Blueprint Competencies

- Exploring Biotechnology
 - » **EB04.00** Investigate cellular design and DNA.
 - » **EB08.00** Analyze biomedical research methods.
 - » **EB09.00** Analyze ethical and professional standards in health care and biotechnology.
- Biomedical Technology
 - » **BT10.00** Analyze biomedical research.
 - » **BT11.00** Analyze challenges to biomedical research.
- Biotechnology and Agriscience Research I
 - » **BA11.00** Analyze the impact of cells on the formation and function of living organisms.
 - » **BA12.00** Explore concepts of Mendelian genetics and inheritance related to plant and animal breeding.
 - » **BA13.00** Explain the role of DNA in sexual reproduction.
 - » **BA15.00** Explore nucleic acid techniques utilized in agriculture.

Curriculum Crosswalk

- Biotechnology and Agriscience Research II
 - » **BB08.0** Examine the various methods of genetic manipulation in plant and animal cells.
 - » **BB16.0** Discuss ethical and practical issues surrounding biotechnology.
- Health Science II
 - » **3.04** Understand biotechnology research and development.

Unit IV-Chapter 3 Nanobiotechnology

Next Generation Science Standards

- **HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
- **HS-LS1-6.** Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.
- **HS-LS3-1.** Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

North Carolina Essential Standards for Science

- **Bio.1.1** Understand the relationship between the structures of cells and their organelles.
- **Bio.3.3** Understand the application of DNA technology.

Career and Technical Education VoCATS Course Blueprint Competencies

- Biomedical Technology
 - » **BT01.00** Interpret biomedical prefixes, suffixes, root words and abbreviations.
 - » **BT02.00** Analyze biomedical ethics and legal principles.
 - » **BT04.00** Analyze mathematical concepts in health care.
 - » **BT09.00** Evaluate careers and techniques that use biomedical technology.
 - » **BT10.00** Analyze biomedical research.
 - » **BT11.00** Analyze challenges to biomedical research.
 - » **BT12.00** Analyze current issues in biomedical technology.

Unit IV-Chapter 4 Regenerative Medicine

Next Generation Science Standards

- **HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
- **HS-LS1-2.** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

Curriculum Crosswalk

- **HS-LS1-6.** Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.
- **HS-LS1-7.** Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.
- **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- **HS-LS3-1.** Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

North Carolina Essential Standards for Science

- **Bio.1.1** Understand the relationship between the structures of cells and their organelles.
- **Bio.1.2** Analyze the cell as a living system.
- **Bio.3.3** Understand the application of DNA technology.

Career and Technical Education VoCATS Course Blueprint Competencies

- Biomedical Technology
 - » **BT02.00** Analyze biomedical ethics and legal principles.
 - » **BT07.00** Examine organ transplantation.
 - » **BT09.00** Evaluate careers and techniques that use biomedical technology.
 - » **BT10.00** Analyze biomedical research.
 - » **BT11.00** Analyze challenges to biomedical research.
 - » **BT12.00** Analyze current issues in biomedical technology.
- Biotechnology and Agriscience Research II
 - » **BB08.0** Examine the various methods of genetic manipulation in plant and animal cells.

Unit IV-Chapter 5 New Technologies in Vaccines

Next Generation Science Standards

- **HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
- **HS-LS1-7.** Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.
- **HS-LS2-7.** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
- **HS-LS2-8.** Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.
- **HS-LS3-1.** Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

Curriculum Crosswalk

North Carolina Essential Standards for Science

- **Bio.1.1** Understand the relationship between the structures of cells and their organelles.
 - **Bio.2.1** Analyze the interdependence of living organisms within their environments.
 - **Bio.3.3** Understand the application of DNA technology.
 - **Bio.3.4** Explain the theory of evolution by natural selection as a mechanism for how species change over time.
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Career and Technical Education VoCATS Course Blueprint Competencies

- Biomedical Technology
 - » **BT02.00** Analyze biomedical ethics and legal principles.
 - » **BT06.00** Analyze issues of public health, infectious diseases and bioterrorism.
 - » **BT09.00** Evaluate careers and techniques that use biomedical technology.
 - » **BT10.00** Analyze biomedical research.
 - » **BT11.00** Analyze challenges to biomedical research.
 - » **BT12.00** Analyze current issues in biomedical technology.
- Biotechnology and Agriscience Research I
 - » **BA16.00** Analyze simple techniques for genetic manipulation in agricultural biotechnology.
- Biotechnology and Agriscience Research II
 - » **BB08.0** Examine the various methods of genetic manipulation in plant and animal cells.