

## WARREN COUNTY SCHOOL DISTRICT

### PLANNED INSTRUCTION

#### **COURSE DESCRIPTION**

**Course Title:** **Biology**

**Course Number:** 00311

**Course Prerequisites:** None

**Course Description:** Biology is recommended for tenth grade students who have successfully completed Introduction to Environmental Science. The course is organized around problems and phenomena, not topics. It explores societal challenges through four units: bacterial infections, hereditary-genetic diseases, sustainable nutrition, and biodiversity. Lessons and assessments are designed to address all three dimensions of the STEELS standards. District marking period assessments are required.

**Suggested Grade Level:** Grade 10

**Length of Course:** Two Semesters

**Units of Credit:** 1

**PDE Certification and Staffing Policies and Guidelines (CSPG) Required Teacher Certifications:**

CSPG 32 Biology

To find the CSPG information, go to [CSPG](#)

**Certification verified by the WCSD Human Resources Department:** ☒ Yes ☐ No

#### **WCSD STUDENT DATA SYSTEM INFORMATION**

**Course Level:** Academic

**Mark Types:** Check all that apply.

☒ F – Final Average ☒ MP – Marking Period ☒ EXM – Final Exam

**GPA Type:** ☐ GPAEL-GPA Elementary ☐ GPAML-GPA for Middle Level ☒ NHS-National Honor Society

☒ UGPA-Non-Weighted Grade Point Average ☐ GPA-Weighted Grade Point Average

**State Course Code:** 03051

To find the State Course Code, go to [State Course Code](#), download the Excel file for SCED, click on SCED 6.0 tab, and choose the correct code that corresponds with the course.

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#### **TEXTBOOKS AND SUPPLEMENTAL MATERIALS**

##### **Board Approved Textbooks, Software, and Materials:**

**Title:** BSCS Biology: Understanding for Life  
**Publisher:** Kendall Hunt  
**ISBN #:** 978-1-7924-9340-9  
**Copyright Date:** 2022  
**WCSD Board Approval Date:** [Click or tap here to enter text.](#)

**Supplemental Materials:** Content specific videos/video clips from BSCS Biology, Swank, YouTube, PBS or other WCSD approved source

#### **Curriculum Document**

##### **WCSD Board Approval:**

**Date Finalized:** 2/27/2024  
**Date Approved:** 6/10/2024  
**Implementation Year:** 2024-2025

#### **SPECIAL EDUCATION, 504, and GIFTED REQUIREMENTS**

The teacher shall make appropriate modifications to instruction and assessment based on a student's Individual Education Plan (IEP), Chapter 15 Section 504 Plan (504), and/or Gifted Individual Education Plan (GIEP).

**SCOPE AND SEQUENCE OF CONTENT AND CONCEPTS**

**Marking Period 1**

- Infectious Disease: How can bacteria make us so sick?
  - Population growth
  - Body systems
  - Specialized cells
  - Homeostasis and feedback
  - Natural selection

**Marking Period 2**

- Heredity and Complex Disease: Why are some people at higher risk of certain diseases than other people?
  - DNA structure determines protein structure
  - Mutation
  - Chromosomes
  - Meiosis and crossing over
  - Mitosis and differentiation
  - Monogenic and polygenic traits
  - Environmental influence on traits
  - Gene by environment interactions

**Marking Period 3**

- How can we use scientific and social understandings of nutrition and natural resources to improve a food system?
  - Photosynthesis
  - Cellular respiration
  - Matter and energy flow
  - Trophic levels
  - Carbon cycle
  - Carrying capacity

**Marking Period 4**

- Why are so many species declining now while a few seem to be expanding, and why does it matter?
  - Ecosystem interactions
  - Disturbances (include anthropogenic changes)
  - Carrying capacity
  - Natural selection and evolution
  - Speciation

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- Extinction
- Biodiversity
- Ecosystem services

**Standards/Eligible Content and Skills**

| <b>Performance Indicator</b>  | <b>PA Core Standard and/or Eligible Content</b> | <b>Marking Period Taught</b> |
|---|---|------------------------------|
| Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.  | 3.1.9-12.B                                      | MP 1                         |
| Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.  | 3.1.9-12.C                                      | MP 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.  | 3.1.9-12.A                                      | MP 1                         |
| Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.   | 3.1.9-12.I                                      | MP 1                         |
| Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.   | 3.1.9-12.L                                      | MP 1                         |
| Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment. | 3.1.9-12.T                                      | MP 1                         |
| Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.  | 3.1.9-12.U                                      | MP 1                         |
| Construct an explanation based on evidence for how natural selection leads to adaptation of populations.  | 3.1.9-12.W                                      | MP 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.  | 3.1.9-12.A                                      | MP 2                         |
| Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.  | 3.1.9-12.B                                      | MP 2                         |
| Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.  | 3.1.9-12.C                                      | MP 2                         |
| Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.   | 3.1.9-12.D                                      | MP 2                         |

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| <b>Performance Indicator</b>   | <b>PA Core Standard and/or Eligible Content</b> | <b>Marking Period Taught</b> |
|--|---|------------------------------|
| Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.  | 3.1.9-12.P                                      | MP 2                         |
| Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.              | 3.1.9-12.Q                                      | MP 2                         |
| Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.  | 3.1.9-12.R                                      | MP 2                         |
| Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.  | 3.1.9-12.E                                      | MP 3                         |
| 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.   | 3.1.9-12.F                                      | MP 3                         |
| 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.                                 | 3.1.9-12.G                                      | MP 3                         |
| Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.  | 3.1.9-12.I                                      | MP 3                         |
| Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.  | 3.1.9-12.J                                      | MP 3                         |
| Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.   | 3.1.9-12.H                                      | MP 3                         |
| Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.  | 3.1.9-12.K                                      | MP 3                         |
| Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.  | 3.1.9-12.L                                      | MP 3                         |
| Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.  | 3.3.9-12.R                                      | MP 3                         |
| Evaluate or refine a technological solution that reduces the impact of human activities on natural systems.  | 3.3.9-12.S                                      | MP 3                         |
| Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. | 3.5.9-12.I (ETS)                                | MP 3                         |

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| <b>Performance Indicator</b>  | <b>PA Core Standard and/or Eligible Content</b> | <b>Marking Period Taught</b> |
|---|---|------------------------------|
| Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.  | 3.5.9-12.K (ETS)                                | MP 3                         |
| Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.  | 3.5.9-12.T (ETS)                                | MP 3                         |
| Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.  | 3.5.9-12.Y (ETS)                                | MP 3                         |
| Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.   | 3.1.9-12.I                                      | MP 4                         |
| Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.   | 3.1.9-12.L                                      | MP 4                         |
| Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.   | 3.1.9-12.M                                      | MP 4                         |
| Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.   | 3.1.9-12.O                                      | MP 4                         |
| Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.  | 3.1.9-12.U                                      | MP 4                         |
| Construct an explanation based on evidence for how natural selection leads to adaptation of populations.  | 3.1.9-12.W                                      | MP 4                         |
| Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.   | 3.1.9-12.S                                      | MP 4                         |
| Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment. | 3.1.9-12.T                                      | MP 4                         |
| Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.   | 3.1.9-12.X                                      | MP 4                         |
| Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.   | 3.1.9-12.N                                      | MP 4                         |

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| <b>Performance Indicator</b>   | <b>PA Core Standard and/or Eligible Content</b> | <b>Marking Period Taught</b> |
|--|---|------------------------------|
| Create or revise a simulation to test a solution to mitigate the adverse impacts of human activity on biodiversity.  | 3.1.9-12.V                                      | MP 4                         |
| Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.   | CC.3.5.9-10.A                                   | MP 1<br>MP 2<br>MP 3<br>MP 4 |
| Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.                          | CC.3.5.9-10.C                                   | MP 3                         |
| Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.                        | CC.3.5.9-10.D                                   | MP 1<br>MP 2<br>MP 3<br>MP 4 |
| Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).  | CC.3.5.9-10.E                                   | MP 1<br>MP 2<br>MP 3<br>MP 4 |
| Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. | CC.3.5.9-10.G                                   | MP 1<br>MP 2<br>MP 3         |
| Assess the extent to which the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem.  | CC.3.5.9-10.H                                   | MP 3<br>MP 4                 |
| Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.                       | CC.3.5.9-10.I                                   | MP 2<br>MP 3                 |
| By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.  | CC.3.5.9-10.J                                   | MP 1<br>MP 2<br>MP 3<br>MP 4 |
| Write arguments focused on discipline-specific content.  | CC.3.6.9-10.A                                   | MP 2                         |
| Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.  | CC.3.6.9-10.B                                   | MP 1<br>MP 2<br>MP 3<br>MP 4 |
| Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.   | CC.3.6.9-10.C                                   | MP 1<br>MP 2<br>MP 3<br>MP 4 |
| Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.                       | CC.3.6.9-10.D                                   | MP 3<br>MP 4                 |

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| PLANNED INSTRUCTION   |  |                              |
| Performance Indicator   | PA Core Standard and/or Eligible Content | Marking Period Taught        |
| Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.  | CC.3.6.9-10.E                            | MP 2                         |
| Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.  | CC.3.6.9-10.F                            | MP 1<br>MP 4                 |
| Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. | CC.3.6.9-10.G                            | MP 1                         |
| Draw evidence from informational texts to support analysis, reflection, and research.   | CC.3.6.9-10.H                            | MP 1<br>MP 2<br>MP 3<br>MP 4 |
| Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.  | CC.3.6.9-10.I                            | MP 1<br>MP 2<br>MP 3<br>MP 4 |

## **ASSESSMENTS**

**PDE Academic Standards:** The teacher must be knowledgeable of the PDE STEELS Standards as well as the Reading and Writing in Science and Technical Subjects Standards and incorporate them regularly into planned instruction.

**Formative Assessments:** The teacher will utilize a variety of assessment methods to conduct in-process evaluations of student learning.

**Effective formative assessments for this course include:** Bell ringers, exit tickets, notice and wonderings, progress checks, quizzes, lab assignments, teacher questioning, class discussions, peer assessments, model trackers, look fors.

**Summative Assessments:** The teacher will utilize a variety of assessment methods to evaluate student learning at the end of an instructional task, lesson, and/or unit.

**Effective summative assessments for this course include:** Lab reports, CER responses, chapter tests, district marking period assessments, culminating tasks, projects.