

**New Mexico School for the Arts and Northern New Mexico College
General Biology - Biol 1110**

Curriculum Alignment for Granting High School Credit

NNMC Course: General Biology - Biol 1110

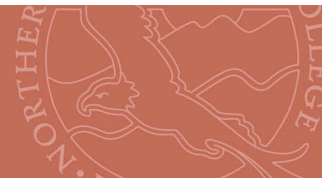
Equivalent NMSA Course Credit: Biology

Course Reviewer: Eric Crites

Rationale for Granting Credit:

The course description, learning outcomes, and course requirements for NNMCC's General Biology course substantially align to and meet the requirements of the New Mexico STEM-Ready standards for high school science. A student who successfully completes the NNMC General Biology course will have substantially the same rigorous preparation for college and career in the standards required by the state STEM-Ready Standards as a student who completes NMSA's Biology.

Submitted to NMSA Governing Council on 9/15/2021.



Course Number Course Name	BIOL 1110 General Biology
Credit Value (Breakdown of theory and lab credits)	3 Theory
Catalog Course Description	You will study important current issues in biology, including changes in the biosphere, evolution, genetics, medical advances, and biotechnology. This course is suitable for non-science majors. Prerequisite: ENG 109N; Co-requisite: BIOL 1110L. (3, 3T+0S).
Course Student Learning Outcomes/Objectives /Competencies	<ol style="list-style-type: none"> 1. Explain the value of the scientific method as a means for understanding the natural world and for formulating testable predictions. 2. Explain how chemical and physical principles apply to biological processes at the cellular level. 3. Understand basic concepts of cell biology. 4. Understand that all organisms share properties of life as a consequence of their common ancestry. 5. Understand fundamental processes of molecular biology. 6. Understand the mechanisms of evolution, including natural selection, genetic drift, mutations, random mating, and gene flow. 7. Understand the criteria for species status and the mechanisms by which new species arise. 8. Understand methods for inferring phylogenetic relationships and the basis for biological classification. 9. Recognize the value of biological diversity (e.g., bacteria, unicellular eukaryotes, fungi, plants, and animals), conservation of species, and the complexity of ecosystems. 10. Explain the importance of the scientific method for addressing important contemporary biological issues
College-Wide Student Learning Outcomes measured (General education courses only)	<ol style="list-style-type: none"> 1. Critical Thought
Program Student Learning Outcomes measured	<ol style="list-style-type: none"> 1. Provide students with broad conceptual background in biological sciences which will enable them to attain an understanding of organismal form, function, diversity, evolution, ecology, mendelian and molecular genetics, cell structure, function and physiology and molecular processes.

NORTHERN NEW MEXICO COLLEGE



NM STEM Ready!

Science Standards

New Mexico

Specific Standards

1.Science and Society

1.Science and Society

PERFORMANCE EXPECTATIONS

Students who demonstrate understanding can:

1-SS-1 NM. Obtain information about how men and women of all ethnic and social backgrounds in New Mexico have worked together to advance science and technology. [Clarification Statement: Introduce the concept that regardless of ethnicity, gender, or social background, any person can contribute to advances in science and technology.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Obtaining, Evaluating and Communicating Information

Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.

- Obtain information using various tests, text features (e.g. headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question and/or supporting a scientific claim.
- Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).

Disciplinary Core Ideas

ETS1.A Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering.
- Asking questions, making observations, and gathering information are helpful in thinking about problems.

Crosscutting Concepts

Patterns

- Patterns in the natural and human designed world can be observed, used to describe phenomena, and used as evidence.

 Connections to Nature of Science

Science Addresses Questions about the Natural and Material World

- Scientists study the natural and material world

Science is a Human Endeavor

- People have practiced science for a long time.
- Men and women of diverse backgrounds are scientists and engineers.

Connections to other DCIs in this grade-band: N/A

Articulation of DCIs across grade-bands: 3–5.ETS1.A

Common Core State Standards Connections:

ELA/Literacy–

- RI.1.1** Ask and answer questions about key details in the text.
- RI.1.2** Identify the main topic and retell key details of a text.
- RI.1.10** With prompting and support, read informational texts appropriately complex for grade 1.
- W.1.7** Participate in shared research and writing projects (e.g., explore a number of “how-to” books on a given topic and use them to write a sequence of instructions.)

Mathematics -



5.Science and Society

5.Science and Society

PERFORMANCE EXPECTATIONS

Students who demonstrate understanding can:

5-SS-1 NM. Communicate information gathered from books, reliable media, or outside sources, that describes how a variety of scientists and engineers across New Mexico have improved existing technologies, developed new ones, or improved society through applications of science.

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Obtaining, Evaluating and Communicating Information

Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.

- Read and comprehend grade-appropriate complex texts and/or other reliable media to summarize and obtain scientific and technical ideas and describe how they are supported by evidence.

Disciplinary Core Ideas

ETS2.A: Interdependence of Science, Engineering, and Technology

- Advances in science offer new capabilities, new materials, or new understanding of processes that can be applied through engineering to produce advances in technology.
- Advances in technology, in turn, provide scientists with new capabilities to probe the natural world at larger or smaller scales; to record, manage, and analyze data; and to model ever more complex systems with greater precision.
- In addition, engineers' efforts to develop or improve technologies often raise new questions for scientists' investigation.

Crosscutting Concepts

Science is a Human Endeavor

- Men and women from all cultures and backgrounds choose careers as scientists and engineers.
- Most scientists and engineers work in teams.
- Science affects everyday life.
- Creativity and imagination are important to science.

Science is a Way of Knowing

- Science is both a body of knowledge and processes that add new knowledge.
- Science is a way of knowing that is used by many people

Connections to other DCIs in this grade-band: N/A

Articulation of DCIs across grade-bands: N/A

Common Core State Standards Connections:

ELA/Literacy –

RI.5.3 Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

SL.5.5 Include multimedia components (e.g., graphics, sounds) and visual displays in presentations when appropriate to enhance the development of main ideas or themes

Mathematics –



MS. Human Impacts

MS.Human Impacts

PERFORMANCE EXPECTATIONS

Students who demonstrate understanding can:

MS-ESS3-3 NM. Describe the advantages and disadvantages associated with technologies related to local industries and energy production. [Clarification Statement: Examples may include examining short- and long-term impacts of related technologies on water usage (such as the withdrawal of water from streams and aquifers, the construction of dams and levees, or sewage treatment plants), land usage (such as urban development, agriculture, the removal of wetlands, or solar panel installation), pollution (such as of the air, water, or land), local employment, and economic stimulus.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Engaging in Argumentation from Evidence

Engaging in argument from evidence in 6–8 builds on K-5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).

- Compare and critique two arguments on the same topic and analyze whether they emphasize similar or different evidence and/or interpretations of facts.

Obtaining, Evaluating and Communicating Information

Obtaining, evaluating, and communicating information in 6–8 builds on K-5 experiences and progresses to evaluating the merit and validity of ideas and methods.

- Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence.

Disciplinary Core Ideas

ESS3.A Natural Resources

- Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes.

ESS3.C Human Impacts on Earth Systems

- The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.

ETS2.B Influence of Engineering, Technology, and Science on Society and the Natural World

- The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural or designed systems.

Systems and System Models

- Models can be used to represent systems and their interactions—such as inputs, processes, and outputs—and energy, matter, and information flows within systems.

Connections to other DCIs in this grade-band: MS.LS2.A; MS.LS2.C; MS.LS4.D

Articulation of DCIs across grade-bands: 3.LS2.C; 3.LS4.D; 5.ESS3.c; HS.LS2.C; HS.LS4.C; HS.LS4.D; HS.ESS2.C; HS.ESS2.D; HS.ESS2.3; HS.ESS3.C; HS.ESS3.D

Common Core State Standards Connections:

ELA/Literacy –

EP 3

They respond to the varying demands of audience, task, purpose, and discipline.

RST 6-8.2

Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

RST 6-8.9

Compare and contrast the information gain from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

WHST 6-8.8

Gather relevant information from multiple print and digital sources, using search terms effectively,; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

WHST 6-8.9

Draw evidence from informational texts to support analysis, reflection, and research.

Mathematics –

MP 3

Construct viable arguments and critique the reasoning of others.

HS. Interdependent Relationships in Ecosystems

HS. Interdependent Relationships in Ecosystems

PERFORMANCE EXPECTATIONS

Students who demonstrate understanding can:

HS-LS2-7 NM. Using a local issue in your solution design, describe and analyze the advantages and disadvantages of human activities that support the local population such as reclamation projects, building dams, and habitat restoration.*

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.

- Design, evaluate, and refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.

Disciplinary Core Ideas

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species.

LS4.D: Biodiversity and Humans

- Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (secondary) (Note: This Disciplinary Core Idea is also addressed by HS-LS4-6.)

ETS1.B: Developing Possible Solutions

- When evaluating solutions it is important to take into account a range of constraints including cost, safety, reliability and aesthetics and to consider social, cultural and environmental impacts. (secondary)

Crosscutting Concepts

Stability and Change

- Much of science deals with constructing explanations of how things change and how they remain stable.

Connections to other DCIs in this grade-band: HS.ESS2.D ; HS.ESS2.E ; HS.ESS3.A ; HS.ESS3.C

Articulation of DCIs across grade-bands: MS.LS2.C; MS.ESS3.C; MS.ESS3.D

Common Core State Standards Connections:

ELA/Literacy–

- RST.9-10.8** 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.
- RST.11-12.7** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
- RST.11-12.8** Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
- WHST.9-12.7** 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.

Mathematics –

- MP.2** Reason abstractly and quantitatively.
- HSN.Q.A.1** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
- HSN.Q.A.2** Define appropriate quantities for the purpose of descriptive modeling.
- HSN.Q.A.3** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

*The performance expectation marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

HS.Science and Society

HS.Science and Society

PERFORMANCE EXPECTATIONS

Students who demonstrate understanding can:

- HS-SS-1 NM. Obtain and communicate information about the role of New Mexico in nuclear science and 21st century innovations including how the national laboratories have contributed to theoretical, experimental, and applied science; have illustrated the interdependence of science, engineering, and technology; and have used systems involving hardware, software, production, simulation, and information flow.** [Clarification Statement: Sandia National Laboratory, Los Alamos National Laboratory, Very Large Array, White Sands, Air Force Research Laboratory, Genome Research, New Mexico Tech, New Mexico State University, University of New Mexico, New Mexico Highlands University, etc.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Obtaining, Evaluating, and Communicating Information

Obtaining, evaluating, and communicating information in 9–12 builds on K–8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.

- Gather, read, and evaluate scientific and/or technical information from multiple authoritative sources, assessing the evidence and usefulness of each source.

Disciplinary Core Ideas

ETS1.A Defining and Delimiting Engineering Problems

- Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them.
- Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges may also have manifestations in local communities.

ETS1.B Developing Possible Solutions

- When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.

ETS2.B Influence of Engineering, Technology, and Science on Society and the Natural World

- New technologies can have deep impacts on society and the environment, including some that were not anticipated.

Crosscutting Concepts

Cause and Effect

- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.

Connections to Nature of Science

Science is a Way of Knowing

- Science is both a body of knowledge that represents a current understanding of natural systems and the processes used to refine, elaborate, revise, and extend this knowledge.
- Science is a unique way of knowing and there are other ways of knowing.
- Science distinguishes itself from other ways of knowing through use of empirical standards, logical arguments, and skeptical review.
- Science knowledge has a history that includes the refinement of, and changes to, theories, ideas, and beliefs over time.

Connections to other DCIs in this grade-band: PS 1.A; PS1.B; PS 1.C

Articulation of DCIs across grade-bands: N/A

Common Core State Standards Connections:

ELA/Literacy –

- RST HS.1** They demonstrate independence
- SL 9-12.1.A** Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
- SL 9-12.4** Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
- SL 9-12.5** Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.
- WHST 9-12.2** Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

Mathematics –

HS.Science and Society

HS.Science and Society

PERFORMANCE EXPECTATIONS

Students who demonstrate understanding can:

- HS-SS-2 NM. Construct an argument using claims, scientific evidence, and reasoning that helps decision makers with a New Mexico challenge or opportunity as it relates to science.** [Clarification Statement: Examples may include, but are not limited to, the Waste Isolation Pilot Plant (WIPP), mining, oil and gas production, solar energy production, environmental remediation, urbanization, water scarcity, forest fires, or flash floods.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Engaging in Argument from Evidence

Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.

- Compare and evaluate competing arguments or design solutions in light of currently accepted explanations, new evidence, limitations (e.g., trade-offs), constraints, and ethical issues.
- Evaluate the claims, evidence, and/or reasoning behind currently accepted explanations or solutions to determine the merits of arguments.
- Construct, use, and/or present an oral and written argument or counter-arguments based on data and evidence

Disciplinary Core Ideas

ETS 1.A Defining and Delimiting Engineering Problems

- Criteria and constraints also include satisfying any requirements set by society such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them.
- Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities.

ETS 1.B Developing Possible Solutions

- When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.

Crosscutting Concepts

Cause and Effect

- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.

Systems and System Models

- Model can be used to predict the behavior of a systems, but these predictions have limited precision and reliability due to the assumptions and approximations inherent in models.

Connections to Nature of Science

Scientific Knowledge is Open to Revision in Light of New Evidence

- Most scientific knowledge is quite durable but is, in principle, subject to change based on new evidence and/or reinterpretation of existing evidence.
- Scientific argumentation is a mode of logical discourse used to clarify the strength of relationships between ideas and evidence that may result in revision of an explanation.

Science Addresses Questions about the Natural and Material World

- Science and technology may raise ethical issues for which science, by itself, does not provide answers and solutions.
- Science knowledge indicates what can happen in natural systems—not what should happen. The latter involves ethics, values, and human decisions about the use of knowledge.

Connections to other DCIs in this grade-band: ETS 1.B Bullet 2

Articulation of DCIs across grade-bands: N/A

Common Core State Standards Connections:

ELA/Literacy–

RST 9-12.1

Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

RST 9-12.8

Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

RI 9-12.1

Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

W 9-12.1

Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

SL 9-12.4

Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

SL 9-12.5

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

Mathematics -

MP2

Reason abstractly and quantitatively

MP3

Construct viable arguments and critique the reasoning of others

MP4

Model with mathematics

HSS.IC.B.6

Evaluate reports based on data