Science, Engineering, and Public Policy Course Overview

Content Area: **Science**
Course(s): **CONTEMPORARY ISSUES OF SCIENCE, Science, Engineering and Public Policy**
Time Period: **Semester Course**
Length: **N/A**
Status: **Published**

Cover

EAST BRUNSWICK PUBLIC SCHOOLS

East Brunswick New Jersey

Superintendent of Schools

Dr. Victor P. Valeski

Science

Science, Engineering, and Public Policy

Course Number: 1104

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Course Adoption: 4/21/1986

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Course Overview

This non-lab science course involves investigating current scientific topics and events as they happen and exploring the policies and laws that govern science on the global stage. Students will learn how societies around the world fund and promote science and technology to improve health, provide energy and food, and help foster new industries and jobs. The course also investigates how science and technology are used to inform and debate policymaking in fields such as environmental policy and health policy, and the roles that scientists, engineers, and other experts play in providing scientific and technical information to the public and to policy-makers.

Modifications

Each teacher, each student, each classroom is unique and adaptations are specific to each situation. Differentiating instruction and providing multiple ways to assess allows more flexibility for students to meet the standards and requirements of the class. Below are samples of the types of adaptations/modifications that may occur for students based on need including ELLs, students with a 504 Plan, Special Education, Basic Skills and Gifted and Talented students.

Adaptations/Modifications:

Input Adapt the way instruction is delivered to the learner. ***For example:*** • Use different visual aids, • Plan more concrete examples, • Provide hands-on activities, • Place students in cooperative groups.	**Output** Adapt how the learner can respond to instruction. ***For example:*** • Allow a verbal vs. written response, • Use a communication book for students, • Allow students to show knowledge with hands-on materials.	**Time** Adapt the time allotted and allowed for learning, task completion or testing. ***For example:*** • Individualize a timeline for completing a task, • Pace learning differently (increase or decrease) for some learners.
Difficulty Adapt the skill level, problem type, or the rules on how the learner may approach the work. ***For example:*** • Simplify task directions. • Use of calculator.	**Level of Support** Increase the amount of personal assistance with specific learner. ***For example:*** • Assign peer buddies, teaching assistants, peer tutors or cross-age tutors.	**Size** Adapt the number of items that the learner is expected to learn or complete. ***For example:*** • Reduce the number of vocabulary words a learner must learn at any one time.
Degree of Participation Adapt the extent to which a learner is actively involved in the task.	**Alternate Goals** Adapt the goals or outcome expectations while using the same materials.	**Substitute Curriculum** Provide differentiated instruction and materials to meet a learner's individual goals.

For example: • Allow for small group/individual presentations vs. presentations to the whole class.	*For example:* • Students in the same class are expected to either write a paragraph, write a bulleted response, or meet with the teacher to provide a verbal response.	*For example:* • Individualize a timeline for completing a task, pace learning differently (increase or decrease) for some learners, • Use of Learning Ally.

Materials and Resources

This course involves assisting students to investigate current scientific topics and events. A variety of internet resources are used to assist students in navigating current events.

Content Specific Standards

SCI.HS.PS2.B	Types of Interactions
SCI.HS.PS1.A	Structure and Properties of Matter
SCI.HS.PS1.B	Chemical Reactions
	Patterns
SCI.HS.ETS1.C	Optimizing the Design Solution
	Using Mathematics and Computational Thinking
SCI.HS.PS1.C	Nuclear Processes
	Analyzing and Interpreting Data
SCI.HS.PS2.A	Forces and Motion
SCI.HS.ETS1.A	Defining and Delimiting Engineering Problems
SCI.HS.PS3.A	Definitions of Energy
SCI.HS.PS3.B	Conservation of Energy and Energy Transfer
SCI.HS.PS3.C	Relationship Between Energy and Forces
SCI.HS.PS4.A	Wave Properties
	Cause and Effect
	Asking Questions and Defining Problems
	Engaging in Argument from Evidence
SCI.HS.PS4.B	Electromagnetic Radiation
	Obtaining, Evaluating, and Communicating Information
SCI.HS.PS3.D	Energy in Chemical Processes
SCI.HS.PS4.C	Information Technologies and Instrumentation

	Constructing Explanations and Designing Solutions
SCI.HS.LS1.A	Structure and Function
	Structure and Function
	Planning and Carrying Out Investigations
	Stability and Change
	Developing and Using Models
SCI.HS.LS1.B	Growth and Development of Organisms
	Systems and System Models
SCI.HS.LS1.C	Organization for Matter and Energy Flow in Organisms
	Energy and Matter
SCI.HS.LS2.A	Interdependent Relationships in Ecosystems
SCI.HS.LS2.B	Cycles of Matter and Energy Transfer in Ecosystems
SCI.HS.LS2.C	Ecosystem Dynamics, Functioning, and Resilience
SCI.HS.LS2.D	Social Interactions and Group Behavior
SCI.HS.LS3.A	Inheritance of Traits
SCI.HS.LS3.B	Variation of Traits
	Scale, Proportion, and Quantity
SCI.HS.LS4.A	Evidence of Common Ancestry and Diversity
SCI.HS.LS4.B	Natural Selection
SCI.HS.LS4.C	Adaptation
SCI.HS.LS4.D	Biodiversity and Humans
SCI.HS.ESS1.A	The Universe and Its Stars
SCI.HS.PS3.D	Energy in Chemical Processes and Everyday Life
SCI.HS.ESS1.B	Earth and the Solar System
SCI.HS.ESS2.B	Plate Tectonics and Large-Scale System Interactions
SCI.HS.ESS1.C	The History of Planet Earth
SCI.HS.ESS2.A	Earth Materials and Systems
SCI.HS.ESS2.C	The Roles of Water in Earth's Surface Processes
SCI.HS.ESS2.E	Biogeology
SCI.HS.ESS3.B	Natural Hazards
SCI.HS.ESS3.A	Natural Resources
SCI.HS.ESS3.C	Human Impacts on Earth Systems
SCI.HS.ESS2.D	Weather and Climate
SCI.HS.ESS3.D	Global Climate Change
SCI.HS-ETS1	Engineering Design
SCI.HS-ETS1-1	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
SCI.HS.ETS1.A	Delimiting Engineering Problems
SCI.HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

SCI.HS-ETS1-3	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.
SCI.HS-ETS1-4	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.
SCI.HS.ETS1.B	Developing Possible Solutions

Interdisciplinary Standards

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
LA.RST.9-10.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
LA.RST.9-10.2	Determine the central ideas, themes, or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LA.RST.9-10.3	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.
LA.RST.9-10.4	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.
LA.RST.9-10.5	Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LA.RST.9-10.6	Determine the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
LA.RST.9-10.7	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.
LA.RST.9-10.8	Determine if the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
LA.RST.9-10.9	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.
LA.WHST.9-10.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence.
LA.WHST.9-10.2	Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
LA.WHST.9-10.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

LA.WHST.9-10.5	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.
LA.WHST.9-10.6	Use technology, including the Internet, to produce, share, and update writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
LA.WHST.9-10.7	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.
LA.WHST.9-10.8	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.
LA.WHST.9-10.9	Draw evidence from informational texts to support analysis, reflection, and research.

21st Century Life and Career Ready Practice Standards

CRP.K-12.CRP1.1	Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.
CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP3.1	Career-ready individuals understand the relationship between personal health, workplace performance and personal well-being; they act on that understanding to regularly practice healthy diet, exercise and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial well-being, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP5.1	Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.
CRP.K-12.CRP6.1	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their

	organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
CRP.K-12.CRP7.1	Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP9.1	Career-ready individuals consistently act in ways that align personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others' action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morals and organizational culture.
CRP.K-12.CRP10.1	Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

Technology Standards

TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.1.12.C	Communication and Collaboration: Students use digital media and environments to

	communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
TECH.8.1.12.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.8.1.12.E	Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.
TECH.8.1.12.F	Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
TECH.8.2.12	Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
TECH.8.2.12.A	The Nature of Technology: Creativity and Innovation: Technology systems impact every aspect of the world in which we live.
TECH.8.2.12.B	Technology and Society: Knowledge and understanding of human, cultural and society values are fundamental when designing technology systems and products in the global society.
TECH.8.2.12.C	Design: The design process is a systematic approach to solving problems.
TECH.8.2.12.D	Abilities for a Technological World: The designed world is the product of a design process that provides the means to convert resources into products and systems.
TECH.8.2.12.E	Computational Thinking: Programming: Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.

Pacing Guide

Topic	Pacing (Blocks)	Assessment Examples
Introduction Databases - School, oyez, acceptable publications vs. non-verified/opinion unsupported sources Bias/Cognitive Bias/Scientific Bias Free speech in information Use COVID-19 as current case study in Bias and Database use	1 2 2 2 2	Research papers Poster Board (single slide) presentations
Student choice of research topic/s - Usual topics- Climate change Alternative energy Pollution - various (superfunds)	15	Research papers Poster Board (single slide) presentations Graded Discussions

Toxicology Plastics GMO Human genetic engineering		
Student choice of research topic/s - Usual topics - Epigenetics Bottled water/water rights Artificial Intelligence/Robotics Space-- travel, exploration, terraforming, blackholes, pollution, etc. Green Urban development/living Vaccines Agriculture - Green/Gene revolution Cloning	15	Research papers Poster Board (single slide) presentations Graded Discussions
Final Independent Research Project - Student independent choice (may work alone or with a partner)	4-5	Final paper -presentation-research

Formative and Summative Assessment

Teachers ultilize a variety of methods for assesment including:

	Unit Tests and Quizzes	**Labs, Projects & Classwork**	**Lab Assessments**	**Homework**
Category Criteria	Individual assessments based on specific or general content knowledge.	Any group work primarily completed in class to be checked and/or graded for completion.	Individual assessments based on group lab work. Lab data and other notes may sometimes be used.	Any work assigned to be completed outside of the classroom.

All students take a common Midterm and Final Exam.

Grading and Evaluation Guidelines

GRADING PROCEDURES:

While assessments of proficiency levels must be valid and reliable they do not need be the same for all students.

In terms of proficiency level the East Brunswick grades equate to:

A	Excellent	Advanced Proficient
B	Good	Above Average Proficient
C	Fair	Proficient
D	Poor	Minimally proficient
F	Failing	Partially Proficient

Marking period grades for Contemporay Issues in Science will be determined using the following weighting:

50% Classwork/Lab work

40% Assessments: Tests, Quiz, Project

10% Quizzes

The final grade for thecourse will be the average of the two marking period grades at 20% weighting, with midterm and final exams at 10% weighing each.

Other Details

SCED

03210 SCIENCE, TECHNOLOGY AND SOCIETY

Science, Technology, and Society courses encourage students to explore and understand the ways in which science and technology shape culture, values, and institutions and how such factors, in turn, shape science and technology. Topics covered may include how science and technology enter society and how they change as a result of social processes.