North Carolina 2013 – Core Alignment Correlation to
Technology: Engineering Our World

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Recommended Grade Levels 6-8

Course Description: This middle school course focuses on applying the design process in the invention or innovation of a new product, process, or system. Through engaging activities and hands-on projects, students focus on understanding how criteria, constraints, and processes affect designs. Emphasis is placed on brainstorming, visualizing, modeling, testing, and refining designs. Students develop skills in researching information, communicating design information, and reporting results. Activities are structured to integrate physical and social sciences, mathematics, English language arts, and art. Work-based learning strategies appropriate for this course include mentorship, school-based enterprise, service learning, and job shadowing. Apprenticeship and cooperative education are not available for this course. Technology Student Association (TSA) competitive events, community service, and leadership activities provide the opportunity to apply essential standards and workplace readiness skills through authentic experiences.

	STANDARD / OBJECTIVE	PAGES / DESIGNATED SECTIONS / URLs
Unit 1: Meet Technology **Lesson 1: Technology to the Rescue!**		
	Identify why humans develop technology to meet individual needs and wants.	16–23
	Examine how products are improved and invented based on current needs to solve problems that could not be solved without new and improved technology.	21–23
	Develop presentations to demonstrate how technology has been modified to meet the demands of society, industry and/or individuals.	29
	Analyze and explain how science, mathematics, and history ensure that technology is developed with more precision and accuracy in meeting the needs of individuals.	21–24, 80, 101, 116, 146, 203, 209, 233, 275, 285, 310, 348, 360, 380, 414, 435, 458, 462, 482, 517
	Recognize how current technologies are often a result of improvements made over time based on current needs and wants using a methodical process studying the historical developments of the specific technology and other similar technology.	21–23, 33–34
	Utilize creativity to develop technology to meet a need or want in order to have a better understanding of its need in the design of technology.	261

Lesson 2: Systems Design: What Every Technology Needs		
	Identify how technologies are interdependent.	259
	Explain the four essential elements of a four part, closed loop system.	214
	Examine how each part of a closed loop system is necessary to ensure that the technology performs its desired goal and/or function.	213–214
	Analyze how different technologies depend on similar and different sets of processes.	16, 315, 330, 464
	Demonstrate and explain how the quality of technology is often a result of the integrity of the system and the resources used in the process.	94–127
Lesson 3: Transforming Resources: From Production to You		
	Explain how all technologies depend on manufacturing technologies.	42, 94–127, 134–166
	Analyze how manufacturing technologies use a system design of production to produce goods, which may involve more than one process.	42, 134–166
	Identify the difference between durable and non-durable goods.	452
	Examine how technology that uses a combination of both synthetics and natural resources help preserve the environment.	453
	Analyze the similarities between teaming and developing and using technology ethically.	523–524
	Develop an assistive medical device using several manufacturing processes.	
Unit 2: Practicing Design **Lesson 1: The Art of Problem Solving**		
	Examine how technology is developed to solve problems as a result of demands, values, and interests of consumers and businesses.	19–23
	Identify how various technology such as medical technologies, agricultural/biotechnology, and communication technology may be developed with economic concerns considered more than environmental and/or long-term impacts.	470
	Analyze how technology can be both desirable and undesirable based on how it is used by society.	25–26
	Find solutions through use of experimentation to solve technological problems which has often been an essential useful strategy in scientific research.	43

Lesson 2: Design: It's a Process		
	Examine how the steps involved in engineering design that is responsible for technology often can be performed in different sequences and repeated as needed while some steps must serve as prerequisites to others.	33–43, 58–59
	Identify design as a planning process that utilizes a process necessary to produce creative solutions to problems *(steps…)*	33–43
	Demonstrate the importance of incorporating engineering design within requirements given via criteria (needs) & constraints (limitations).	16, 35, 43
	Analyze how despite our best efforts to use engineering design principles sometimes the results may not be perfect.	50–59
Lesson 3: Mirror, Mirror		
	Demonstrate the engineering design steps by designing an innovation.	33–43
	Analyze tools to use (journals, surveys) and the importance documenting how problems are solved via the engineering design process to avoid malfunctions and patient infringement.	63
	Develop an Engineering Design Journal to practice using the EDJ Process to design technology innovations.	63
	Re-design in teams an existing technology.	62
	Utilize tools such as computer aided design software and other modeling tools to provide two-dimensional and three-dimensional representations of technology innovations/solutions.	40, 69–88
Unit 3: Project Revive: Revitalizing Communities Using Existing Models **Lesson 1: Disaster Driven Problems**		
	Examine how communities often must be re-developed due to not only natural disasters but also human-made disasters which often *impacts* humans' attitudes and choices about technology's development.	
	Determine whether new technologies need to be developed or if modifying existing products would the best alternative/solution.	489
	Utilize various tools to help gather data to evaluation the positive and negative effects of current technologies that may need modification.	223
	Analyze the data collected regarding the extent of the disaster using a variety of communication technologies such as GPS, data tables using with spreadsheets, databases, graphs and charts.	91

	Interpret by evaluation if the information obtained is accurate and useful for the purpose of determining various impacts of the disaster (how much clean up needed, how many shelters, which tools needed for repair…)	
Lesson 2: What is Next? Finding Alternatives/Solutions		
	Examine existing models of revitalized and artificially designed communities including the International Space Station and eco-house designs	
	Examine artificial eco systems made by humans to replicate natural environments that may be useful models for redeveloping ecosystems altered or destroyed by disasters.	432
	Brainstorm respectfully in teams to derive alternatives for the design of a community that will be revitalized including eco-friendly solutions. to derive solutions that involves designs that have proved to not be "perfect" (not to be restricted to one's own ideas).	
Lesson 3: Designing Solutions		
	Research to Identify the various areas needed to be addressed to provide the best solutions to meet the needs to revitalize a community utilizing advances in all of the different technologies such as medical, agricultural/related biotechnologies (including sanitation processes, refrigeration, dehydration, and preservation to provide long term storage and reduce health risks) energy/power, transportation and construction technologies.	
	Develop the criteria and constraints for a given design solution.	35, 43
	Apply the design process to document how solutions will be best implemented.	33–43
	Design CAD and/or sketched visualizations that would communicate to others how the design solution would be modeled to be eventually manufactured.	68–85
Lesson 4: Producing Engineering Design Technology Solutions		
	Produce various solutions to create a model of a revitalized community by engineering design for each of the technologies impacted. (metric used in all other countries).	
	Determine the several subsystems necessary to build temporary and permanent community resources such as bathrooms, shelters, water usages that are practical and environmentally-friendly forms of technology.	212–217

	Produce a model of a revitalized community using a mock building code manual that can be used for a prototype considering how different communities/countries use different units of measurement.	
	Test, redesign, and present solutions with models with opportunity for audience feedback.	33–42
	Examine and determine the subsystems of an eco-house.	212–220
	Debate solutions to address future world concerns using technologies.	293, 445