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Engineering

Correlation of		
Engineering Fundamentals © 2018		
to Maryland Department of Education		
Course: Middle School Technology & Engineering		
Standards	Correlating Textbook Pages	
Standard 1: The Nature of Technology - Students will develop an understanding of the nature of technology.		
Characteristics and Scope of Technology		
Differentiate between technological inventions and	4-5-24	
innovations.	-+-5, 24	
Identify the need for technological invention and	4-5	
innovation.	+ 5	
Describe how marketing and advertising is used to	4-5	
create demand for technological products (STL, 3I).	+ 5	
Core Concepts of Technology		
Describe the components of a technological system.	116-134	
Design a model that demonstrates how subsystems and	119-120	
system elements interact within systems.	113 120	
Select or design a technological system to perform a task	119-120	
based on specific requirements.	115 120	
Assemble and operate simple technological systems.	119-120	
Analyze the performance of a feedback control system.	126-132	
Troubleshoot a malfunctioning system (STL, 10F).	126-132	
Use tools, materials, and machines safely to diagnose,	126-132	
adjust and repair systems (STL, 12I).	120 132	
Provide examples of optimization and trade-offs for	130-132	
products, processes, and systems.	130 132	
Connections Between Technology and Other Fields of Stu	dy	
Analyze how knowledge gained from other fields of		
study has impacted the development of technological	6-8	
products and systems (STL, 3F).		
Describe how patents protect intellectual property	32 54	
(STL, 3I).	52,51	
Assess the limitations of open source technology.	32, 54	
Standard 2: Impacts of Technology - Students will evaluat	te the impact of technology.	
Effects of Technology		
Discriminate between responsible and irresponsible use	4-8, 126-132	
of technology.		
Analyze the cultural, social, economic, political and	4-5, 16-19	
environmental effects of technology.		
Describe legal and ethical concerns resulting from the	28-30, 42, 253, 367	
development and use of technology (STL, F).		
Explain that decisions about the use of technology		
involve trade-offs between positive and negative effects	5, 91-92	
(STL, 4I).		



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Standards	Correlating Textbook Pages
Assess the impact of technology transfer from one	- 24
society to another (STL, 4K).	31
Evaluate the advantages and disadvantages of	20.05
technology.	33-35
Role of Society in the Development and Use of Technolog	V
Describe how new technologies have evolved as a result	
of combing existing technologies.	16-17
Assess the impact that technological invention and	
innovation has on the needs and wants of a society	31
(STL, 4E).	
Explain how technological advances have impacted the	
nature of work.	31-35
Standard 3: Engineering Design and Development - Stu	dents will demonstrate knowledge of and apply the
engineering design process to develop solu	tions to problems.
Explain how the desian process is an iterative, systematic	approach to problem solving that includes collaboratively:
Defining a problem - students will be able to employ	
technical reading and writing skills to develop concise	7-8
problem statement.	
Brainstorming - students will be able to apply team	
brainstorming rules and techniques	45, 68-72
Researching and Generating Ideas - students will be	
able to conduct research to assess prior solutions to the	68-72, 83-88
problem.	,
Identifying Criteria and Specifying Constraints -	
students will be able to assess the criteria (guidelines)	
and prioritize constraints (limitations) of the problem.	5, 66-68, 92
This includes people, time, materials, capital, energy, etc	
Exploring Possibilities - students will conduct research	
and explore possibilities for potential solutions.	88-92
Selecting an Approach - students will be able to employ	
a decision matrix to select the best approach to solve	92-93
the problem.	
Developing a Design Proposal - students will be able to	
create a plan of action that details the specifics of the	40-55
project.	
Making a Model or a Prototype - students will be able	
to develop conceptual, mathematical, or physical	
models and/or a prototype that performs the final	
solution and can be used for testing/evaluating. This	116-125
includes the creation of two and three dimensional scale	
drawings.	
Testing and Evaluating Design Using Specifications	
students will be able to use establish specifications to	126-132
assess their design product.	
Refining a Design - student will employ data- driven	424
decision making to improve their product.	134



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Standards	Correlating Textbook Pages
Creating or Making the Product - students will be able	
to produce the design product	132-133
Communicate Processes and Results -students will be	
able to communicate throughout the design process	
demonstrating application of the essential skills and	7-8. 133-134
knowledge presented in Maryland's College and Career	
Ready Disciplinary Literacy Standards.	
Apply the design process to develop solutions to real-	
world problems.	5, 7-8, 40-55, 66-72, 83-93, 116-134
Document the design process and solutions in a journal,	
notebook, or portfolio.	132-133
Assess the reliability and validity of researched	
information.	68-72, 83-88
Evaluate competing design solutions using a systematic	
process to determine how well they meet the criteria	126-132
and constraints of a problem (MS-ETS1-2).	
Discriminate between ethical and unethical engineering	
practices	28-30, 42, 253, 367
Standard A. Care Technologies and The Designed World	d Students will demonstrate knowledge of the sore
technologies that underpin the designed world and major enterprises that produce the goods and services of the designed world. Core technologies include but are not limited to biotechnology, electrical, electronics, fluid, material, mechanical, optical, structural, and thermal technologies. Major enterprises include medical, agriculture, biotechnology, energy and power, information and communication, transportation, and manufacturing and construction technologies.	
Analyze the function of select core technologies in the de	signed world.
Medical Technologies	
Explore the function and application of several medical	366-367
technologies.	500 507
Correlate advances in medical technologies to	
improvements in the length and quality of life for	366-367
multicellular organisms.	
Describe ethical considerations involved in the	
development and application of medical technologies.	366-367
Agricultural Tochnologias	
Explore the function and application of a variety of	
technological processes, equipment, and systems used	
in agriculture (e.g. agroforestry, irrigation, global	14-1, 359-363
nositioning systems)	
Design develop use manage maintain and assess a	
closed system that supports living organisms (e.g.	14-15 359-361
terrarium hydrononics station)	14-15, 559-501
Evaluate the positive and negative effects of	
technological solutions to agricultural problems	14-15, 359-363
Describe techniques used to provide long-term storage of food and reduce the health risk caused by tainted food	
(STL, 15J).	



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Standards	Correlating Textbook Pages
Biotechnology	
Explore applications of biotechnology.	350
Examine positive and negative impacts of biotechnology.	350
Analyze ethical, societal, and legal issues that arise from	250
biotechnology applications.	550
Energy and Power Technologies	
Analyze how power systems are used to drive and	
provide propulsion to other technological products and	141-142
systems (STL, 16H).	
Design, construct, and test a device that either	141-142
minimizes or maximizes energy transfer (MS-PS3-3).	171 172
Explore ways to conserve energy.	141-142
Assess advantages and disadvantages of different forms	35
of renewable and nonrenewable energy.	
Information and Communication Technologies	
Assess the application and functionality of the parts of a	
communication system (source, encoder, transmitter,	7
receiver, decoder, and destination) (STL, 17H).	
Explore different steps in the communication process	
(encode message, encoded message is transmitted or	7
switched through a channel, message is received and	
decoded by the receiver).	
Design and send messages using various types of	7
communication systems.	-
Design and develop a simple communications system.	7
Transportation Technologies	
Investigate the functionality of various methods of	211
transportation for land, water, air, and space.	
Assess processes necessary for an entire transportation	211
system to operate efficiently (e.g. receiving, noiding,	211
Storing, loading) (STL, 181).	211
Analyze the interdependence of transportation systems.	211
besign and develop models of subsystems in a	211
cusponsion, guidance, control, and support)	211
Suspension, guidance, control, and support).	
vehicle to be use on land in the sea, in the air, or in	211
space	211
Space.	
design and operation of transportation system	211
Manufacturina Technologies	
Identify the components of a manufacturing system	12
Identify resources required for manufacturing systems	
to operate properly (e.g. raw materials, finances, people.	194-215
tools, machines, time).	



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Standards	Correlating Toythook Degas
Standards	Correlating Textbook Pages
Examine the mechanical and chemical processes of	194-215
manufacturing.	
Analyze the development, production, application,	
marketing, acquisition, and disposal of manufactured	194-215
products.	
Assess the impact that technology (e.g. computer-aided	
design, automation, robots, assembly lines) has on the	194-215
manufacturing process.	
Assess the impact that the manufacturing process has	194-215
on people and the environment.	
Classify manufactured goods according to their	19/-215
longevity.	
Assess a variety of manufacturing methodologies.	194-215
Construction Technologies	
Analyze the type of and purpose for a variety of	0.25
structures.	9, 25
Analyze factors used in the selection of designs for	
structures (e.g. laws, codes, style, cost, climate,	9, 25
function) (STL, 20F).	
Examine different subsystems within buildings. Analyze	0.25
the maintenance of structures and subsystems.	9, 25
Assess the role that community planning, laws, and	
regulation have in the development and maintenance of	9, 25
structures.	
Design, use, and assess building material.	9, 25
Design and create models of structures.	9, 25
Analyze the type of and purpose for a variety of	0.05
structures.	9, 25
Standard 5: Computational Thinking and Computer Sci	ence Applications - Students will be able to apply
computational thinking skills and computer	science applications as tools to develop solutions to
engineering problems.	
Select and use appropriate tools and technology	
resources to accomplish a variety of tasks and solve	7, 12, 144, 183, 367
problems.	
Use the basic steps in algorithmic problem solving to	c
design solutions to problems.	6, 117-119
Use modeling and simulation to represent and	
understand natural phenomena.	7, 116-134
Implement problem solutions using a programming	
language.	257-258
Use productivity technology tools for individual and	
collaborative writing, communication, presentation.	7-8. 133-134
and/or publishing activities.	, -
Apply responsible legal and ethical behaviors in the use	
of technology systems and software.	28-30, 42, 253, 367



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Standards	Correlating Textbook Pages
Analyze how computational thinking and computer	120-125
programing can be used as tools for problem solving.	120-125