

MANCHESTER REGIONAL HIGH SCHOOL

INTRODUCTION TO ENGINEERING



Adopted DATE

Revised DATE

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**Manchester Regional High School
District Mission Statement**

The mission of Manchester Regional High School is to produce respectful, responsible and well-rounded graduates who possess the knowledge and skills to become contributing members of society and life-long learners.

Highly qualified, collaborative and innovative staff addresses the needs of a diverse school community in a stimulating and nurturing environment.

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MANCHESTER REGIONAL HIGH SCHOOL

COURSE DESCRIPTION: Introduction to Engineering

The Introduction to Engineering course in the Science and Engineering Academy is designed to create a broad-based foundation for students who desire a career pathway in the field of Engineering. Core concepts and principles of Engineering Design combined with unique laboratory settings will be the key elements of this course.

Stakeholders will use engineering driven designs in conjunction with Computer aided Machining (CAM) and 3-dimensional prototyping. Additional content areas will include web-based portfolios and exposure to a paperless classroom model with an aim at improving student technological literacy. The content and methods of this course will provide a foundation for future engineering pathways and prerequisites for additional Science and Engineering Academy courses.

The Introduction to Engineering Course aligns with NJ Core Content Standards 8.1 and 8.2

COURSE DATA:

Length of course: Full year

Credits: Five

Periods per week: Five

Classification: Grade 9

Prerequisite: None

EVALUATION:

The purposes of evaluation are to provide information about student progress and to determine whether students have learned the subject matter, which has been taught. Teachers will evaluate student progress by utilizing standardized tests, teacher-made quizzes and tests, oral questioning, class participation. Other evaluative criteria will include homework, special projects, special exams and other school records.

NOTE: The following pacing guide was developed during the creation of these curriculum units. The actual implementation of each unit may take more or less time. Time should also be dedicated to preparation for benchmark and State assessments, and analysis of student results on the same. A separate document is included at the end of this curriculum guide with suggestions and resources related to State Assessments (if applicable). The material in this document should be integrated throughout the school year, and with an awareness of the State Testing Schedule. It is highly recommended that teachers meet throughout the school year to coordinate their efforts in implementing the curriculum and preparing students for benchmark and State Assessments in consideration of both the School and District calendars.

Curriculum Scope and Sequence

Content Area: Science & Engineering	Name of Course: Introduction to Engineering	Grade Level(s): Grade 9
General Overview and Pacing		
	Topic/Unit Name	Suggested Pacing (Days/Weeks)
Unit 1/ Chapter 1	What is Engineering	7-8 Days
Unit 2/Chapter2	What is Engineering Design	7-14 Days
Unit 3/Chapter 16	Engineering as a Profession	7-14 Days
Unit 4/Chapter 5	Engineering Communication	4-6 Days
Unit 5/Chapter 6	Engineering Modeling, Prototyping and Testing	4-10 Days
Unit 6/Chapter 7	Materials and Processing in Engineering	4-10 Days
Unit 7/Chapter 14	Engineering Production Systems	5-9 Days
Unit 8/Chapter 8	Electrical Engineering	7-10 Days
Unit 9	Green Engineering	5-7 Days
Unit 10 /Chapter 9	Civil Engineering	5-7 Days
Unit 11/Chapter 13	Aerospace Engineering	7-10 Days
Unit 12/Chapter 12	Computer Engineering	4-6 Days
Unit 13/Chapter 15	Chemical Engineering	3-5 days
Unit 14 / Chapter 10	Mechanical Engineering	4-7 days
Unit 15	Engineering Graphics	12- 17 Weeks

UNIT 1: WHAT IS ENGINEERING

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
MP1	<p>What is Engineering?</p> <p>Is Engineering Right For me?</p> <p>What are the various types of engineering career fields</p> <p>What types of knowledge and areas of focus do Engineers Explore?</p> <p>What types of Technical knowledge do Engineers Explore?</p> <p>What are desirable Skills and Traits of Engineers?</p> <p>How do Engineers use CAD/CAM?</p> <p>What is the future of Engineering?</p>	<p><u>Instructional Strategies:</u></p> <ul style="list-style-type: none"> -Paperless class format -PowerPoint -Video -Chapter 1 of Text -Laboratory safety -Laboratory learning Experiences -Web Portfolio -Blog Postings -Student reflections -Class discussions 	<p>Define Engineering.</p> <p>Individually reflect if Engineering is Appropriate field.</p> <p>Identify the Scope of Engineering.</p> <p>Identify the various types of Engineers.</p> <p>Identify the scope of essential understandings required to become an engineer</p> <p>Identify desirable traits of Engineers</p> <p>Individually Provide a perspective on the future of Engineering.</p> <p>Describe the scope of CAD/CAM in Engineering.</p>	<p><u>Summative Assessment:</u></p> <ul style="list-style-type: none"> -Web Portfolio - Unit Project- Web Portfolio -Unit Reflection via Blog <p><u>Formative Assessment:</u></p> <ul style="list-style-type: none"> - Lab Safety Observations -Class discussions - Web Site Discussion Boards -Instructor Question and Answer Session - Laboratory Session Participation 	<p>NJ CCS 8.1</p> <p>NJ CCS 8.2</p> <p>8.1.2.A.2</p> <p>8.1.2.A.3</p> <p>8.1.2.A.4</p> <p>8.4.8.C.1</p> <p>8.1.8.D.1</p> <p>8.1.8.D.2</p> <p>8.1.8.D.3</p> <p>8.1.12.A.1</p> <p>8.1.12.A.2</p> <p>8.1.12.A.3</p> <p>8.1.12.A.4</p> <p>8.2.12.A.1</p> <p>8.2.12.B.1</p> <p>8.2.12.B.2</p> <p>8.2.12.B.3</p> <p>8.2.12.C.1</p> <p>8.2.12.C.2</p> <p>8.2.12.C.3</p> <p>8.2.12.D.1</p> <p>8.2.12.E.1</p> <p>8.2.12.E.2</p>

UNIT 2: ENGINEERING DESIGN

Month	Essential/ Supporting Questions	Content	Skills/Concepts	Assessment	Standards
MP1	<p>What is Engineering Design?</p> <p>What is Investigation and Research?</p> <p>What role do parameters play in Design?</p> <p>What are Common Engineering Design Mistakes?</p> <p>What are the stages of the Engineering Design Loop?</p> <p>What is a target population?</p> <p>What are Ergonomics?</p> <p>What role Do Ergonomics play in Design?</p>	<p><u>Instructional Strategies:</u></p> <ul style="list-style-type: none"> -Paperless class format -PowerPoint -Video- -Chapter 2 of Text -Laboratory safety <p>Laboratory learning experiences</p> <ul style="list-style-type: none"> -Web Portfolio -Blog Postings -Student reflections -Class discussions -Measure of Man Hand out 	<p>Describe the importance of Investigation and Research.</p> <p>Describe the scope of the Engineering Design Loop.</p> <p>Identify common pitfalls in Engineering Design.</p> <p>Translate the Measure of Man handout into target populations for design.</p> <p>Ergonomically design a mouse for an identified target population.</p> <p>Present rationale for design to peers.</p> <p>Describe role parameters play in Engineering Design.</p>	<p><u>Summative Assessment:</u></p> <ul style="list-style-type: none"> -Web Portfolio - Unit Project- Ergonomic Mouse Design -Unit Reflection via Blog <p><u>Formative Assessment:</u></p> <ul style="list-style-type: none"> -Unit Quiz - Lab Safety Observations -Class discussions - Web Site Discussion Boards -Instructor Question and Answer Session - Laboratory Session Participation 	<p>NJ CCS 8.1</p> <p>NJ CCS 8.2</p> <p>8.1.2.A.2</p> <p>8.1.2.A.3</p> <p>8.4.8.C.1</p> <p>8.1.8.D.1</p> <p>8.1.8.D.2</p> <p>8.1.8.D.3</p> <p>8.1.12.A.1</p> <p>8.1.12.A.2</p> <p>8.1.12.A.3</p> <p>8.1.12.A.4</p> <p>8.2.12.A.1</p> <p>8.2.12.B.1</p> <p>8.2.12.B.2</p> <p>8.2.12.B.3</p> <p>8.2.12.C.1</p> <p>8.2.12.C.2</p> <p>8.2.12.C.3</p> <p>8.2.12.D.1</p> <p>8.2.12.E.1</p> <p>8.2.12.F.1</p> <p>8.2.12.F.2</p> <p>8.2.12.F.3</p>

UNIT 3: ENGINEERING AS A PROFESSION

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
MP1	<p>What are the various functions of Engineers?</p> <p>What is the professional Aspect of Engineering?</p> <p>What is the purpose of Code of Ethics?</p> <p>What are examples of Types of impacts in Engineering?</p> <p>What is the Future of Engineering?</p> <p>What is the Role of ABET?</p> <p>What economic, societal and environmental impacts of Engineering?</p>	<p><u>Instructional Strategies:</u></p> <ul style="list-style-type: none"> -Paperless class format -PowerPoint -Video- -Chapter 16 of Text -Laboratory safety Laboratory learning experiences -Web Portfolio -Blog Postings -Student reflections -Class discussions 	<p>Describe the role and scope of the Accreditation Board for Engineering and Technology (ABET).</p> <p>Describe the role of the code of ethics in Engineering.</p> <p>Identify and rationalize the impacts engineering can have environmentally, socially, and economically.</p> <p>Explore and explain a selected negative impact of Society, Ethics and Technology.</p> <p>Describe the various functions performed by professional Engineers</p>	<p><u>Summative Assessment:</u></p> <ul style="list-style-type: none"> -Web Portfolio - Unit Project-Presentation on a SET- Society Ethics and Technology. -Unit Reflection via Blog <p><u>Formative Assessment:</u></p> <ul style="list-style-type: none"> - Lab Safety Observations -Class discussions - Web Site Discussion Boards -Instructor Question and Answer Session - Laboratory Session Participation - Worksheet Completion 	<p>NJ CCS 8.1 NJ CCS 8.2</p> <p>8.1.2.A.2 8.1.2.A.3 8.1.2.A.4 8.4.8.C.1 8.1.8.D.3 8.1.12.A.1 8.1.12.A.3 8.1.12.A.4 8.2.12.A.1 8.2.12.B.1 8.2.12.B.2 8.2.12.B.3 8.2.12.C.1 8.2.12.C.2 8.2.12.C.3 8.2.12.E.1 8.2.12.F.1 8.2.12.F.2 8.2.12.F.3 8.2.12.G.1</p>

UNIT 4: ENGINEERING COMMUNICATION

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
MP1	<p>What is the importance of Engineering Communications?</p> <p>What role do drawings play in Engineering Communication?</p> <p>What are the various types of Engineering renderings?</p> <p>What is the role of CAD in Engineering Communication?</p> <p>What is the role of CAM in Engineering Communication?</p> <p>How has CAM changed Communications?</p>	<p><u>Instructional Strategies:</u></p> <ul style="list-style-type: none"> -Paperless class format -PowerPoint -Video- -Chapter 5 of Text -Laboratory safety Laboratory learning experiences -Web Portfolio -Blog Postings -Student reflections -Class discussions 	<p>Demonstrate the ability to provide clear directions to the reverse Engineering of the Tower of Hanoi.</p> <p>Demonstrate ability to communicate ideas through sketch renderings.</p> <p>Describe the scope and types of Engineering drawings.</p> <p>Describe the scope and importance of Engineering Communication Skills.</p> <p>Describe the role of CAD in modern day Engineering.</p> <p>Provide a perspective on PTC/CREO</p> <p>Describe the CAM has changed Engineering and Engineering Communication.</p> <p>Describe Makerbot CAM Systems.</p>	<p><u>Summative Assessment:</u></p> <ul style="list-style-type: none"> -Web Portfolio - Unit Project- Reverse Engineer the Tower of Hanoi -Unit Reflection via Blog <p><u>Formative Assessment:</u></p> <ul style="list-style-type: none"> -Unit Quiz - Lab Safety Observations -Class discussions - Web Site Discussion Boards -Instructor Question and Answer Session - Laboratory Session Participation 	<p>NJ CCS 8.1 NJ CCS 8.2</p> <p>8.1.2.A.2 8.1.2.A.3 8.1.2.A.4 8.1.8.D.1 8.1.8.D.2 8.1.8.D.3 8.1.12.A.1 8.1.12.A.2 8.1.12.A.3 8.2.12.A.1 8.2.12.B.1 8.2.12.B.2 8.2.12.B.3 8.2.12.C.1 8.2.12.C.2 8.2.12.C.3 8.2.12.D.1 8.2.12.F.1 8.2.12.F.2 8.2.12.F.3 8.2.12.G.1</p>

UNIT 5: MODELING, TESTING, PROTOTYPING

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
MP1	<p>What is the role of Predictive analysis to the Engineering Design process?</p> <p>Describe the principles used in mathematical Modeling?</p> <p>What are the various types of Physical modeling?</p> <p>How is computer modeling used in different Engineering fields?</p> <p>What is the process of testing?</p> <p>What are the various types of final outputs?</p> <p>Explain Aesthetics Vs. Functionality?</p>	<p><u>Instructional Strategies:</u></p> <ul style="list-style-type: none"> -Paperless class format -PowerPoint -Video- -Chapter 6 of Text -Laboratory safety Laboratory learning experiences -Web Portfolio -Blog Postings -Student reflections -Class discussions 	<p>Identify common mathematical formulas used in Engineering.</p> <p>Describe the various types of testing including, stress, thermal, compression, tensile, flammability and elasticity.</p> <p>Describe how the Makebot Replicator 2.0 produces prototypes and models.</p> <p>Define Aesthetics and functionality and their balance.</p> <p>Participate in Laboratory Tensile Strength Experiment.</p> <p>Produce a predictive analysis based upon Testing.</p>	<p><u>Summative Assessment:</u></p> <ul style="list-style-type: none"> -Web Portfolio - Unit Project- Makerbot Replicator 2.0 Unit Project- Tensile Strength Testing -Unit Reflection via Blog <p><u>Formative Assessment:</u></p> <ul style="list-style-type: none"> -Unit Quiz - Lab Safety Observations -Class discussions - Web Site Discussion Boards -Instructor Question and Answer Session - Laboratory Session Participation 	<p>NJ CCS 8.1 NJ CCS 8.2</p> <p>8.1.2.A.3 8.1.2.A.4 8.1.8.D.1 8.1.8.D.2 8.1.8.D.3 8.1.12.A.1 8.1.12.A.2 8.1.12.A.3 8.1.12.A.4 8.2.12.A.1 8.2.12.B.2 8.2.12.B.3 8.2.12.C.1 8.2.12.C.2 8.2.12.C.3 8.2.12.D.1 8.2.12.E.1 8.2.12.F.1 8.2.12.F.2 8.2.12.F.3 8.2.12.G.1</p>

UNIT 6: MATERIALS AND PROCESSING IN ENGINEERING

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
MP1	<p>What is Materials Engineering?</p> <p>What are the various types of materials Engineers use?</p> <p>What are some examples of Material Tests.</p> <p>What is Nanotechnology?</p> <p>What are emerging materials in the field of engineering?</p> <p>What methods are appropriate for processing materials?</p> <p>What safety features are involved in processing Materials?</p> <p>Describe range of Material properties?</p>	<p><u>Instructional Strategies:</u></p> <ul style="list-style-type: none"> -Paperless class format -PowerPoint -Video- Reading Ruler -Videe- Lab Safety -Chapter 7 of Text -Laboratory safety Laboratory learning experiences -Web Portfolio -Blog Postings -Student reflections -Class discussions 	<p>Research and investigate a selected material - present findings</p> <p>Identify the Variety of Materials used including polymers, composites, biomaterials, alloys and Nano particles.</p> <p>Participate in the processing of materials, including Pilot holes, countersinks, ripping, and vacuum forming.</p> <p>Identify the various ways a material can be tested.</p> <p>Identify new and emerging processing techniques for materials.</p> <p>Define Materials Engineering.</p>	<p><u>Summative Assessment:</u></p> <ul style="list-style-type: none"> -Web Portfolio - Unit Project- Power point presentation of selected material. -Unit Project- Process selected Material- Design Challenge <p><u>Formative Assessment:</u></p> <ul style="list-style-type: none"> -Unit Quiz - Lab Safety Observations -Class discussions - Web Site Discussion Boards -Instructor Question and Answer Session - Laboratory Session Participation 	<p>NJ CCS 8.1 NJ CCS 8.2</p> <p>8.1.2.A.2 8.1.2.A.3 8.1.2.A.4 8.4.8.C.1 8.1.8.D.2 8.1.8.D.3 8.1.12.A.1 8.1.12.A.2 8.1.12.A.3 8.1.12.A.4 8.2.12.A.1 8.2.12.B.1 8.2.12.B.2 8.2.12.B.3 8.2.12.C.1 8.2.12.C.2 8.2.12.C.3 8.2.12.D.1 8.2.12.E.1 8.2.12.F.2 8.2.12.F.3 8.2.12.G.1</p>

UNIT 7: ENGINEERING PRODUCTION SYSTEMS

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
MP2	<p>What are characteristics of Mass Production?</p> <p>What are the characteristics of Lean Production?</p> <p>What aspects of Lean production are more efficient than Mass production?</p> <p>What cultural aspects influence lean and mass production strategies?</p> <p>How has the Japanese Lean Production Techniques influenced global production?</p>	<p><u>Instructional Strategies:</u></p> <ul style="list-style-type: none"> -Paperless class format -PowerPoint -Video- -Chapter 14 of Text -Laboratory safety Laboratory learning experiences -Web Portfolio -Blog Postings -Student reflections -Class discussions 	<ul style="list-style-type: none"> - Describe the scope of Lean production. - Describe the scope of Mass production. - - Identify common characteristics of Lean Production. - Describe common characteristics of Mass Production - Examine and describe which production system model is more efficient. -Demonstrate through experience how jigs and fixtures play a role in production. -Describe safety protocols in production systems. - Describe Cultural influences and how they have effected global production systems 	<p><u>Summative Assessment:</u></p> <ul style="list-style-type: none"> -Web Portfolio - Unit Project- Lean Vs. Mass Production Assembly Line -Unit Reflection via Blog - Unit Test <p><u>Formative Assessment:</u></p> <ul style="list-style-type: none"> -Unit Quiz - Lab Safety Observations -Class discussions - Web Site Discussion Boards -Instructor Question and Answer Session - Laboratory Session Participation - Worksheet Completion 	<p>NJ CCS 8.1 NJ CCS 8.2</p> <p>8.1.2.A.2 8.1.2.A.3 8.1.2.A.4 8.4.8.C.1 8.1.8.D.1 8.1.8.D.2 8.1.12.A.1 8.1.12.A.2 8.1.12.A.3 8.1.12.A.4 8.2.12.A.1 8.2.12.B.1 8.2.12.B.2 8.2.12.B.3 8.2.12.C.2 8.2.12.D.1 8.2.12.E.1 8.2.12.F.1 8.2.12.F.2 8.2.12.G.1</p>

UNIT 8: ELECTRICAL ENGINEERING

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
MP2	<p>What is Electrical Engineering?</p> <p>Explain the secondary and college level education requirements for employment in the Electrical Engineering profession?</p> <p>How do electrons move on an atomic level?</p> <p>What are the characteristics of voltage, power, current and resistance?</p> <p>What is Soldering?</p> <p>What is the role Schematics play in electrical engineering design?</p> <p>What is the role of IEEE?</p> <p>What is OHMS Law?</p> <p>What are series, parallel and series in parallel circuits?</p>	<p><u>Instructional Strategies:</u></p> <ul style="list-style-type: none"> -Paperless class format -PowerPoint -Video- Electrical Safety -Chapter 8 of Text -Laboratory safety Laboratory learning experiences -Web Portfolio -Blog Postings -Student reflections -Class discussions 	<p>Demonstrate ability to communicate electrical circuits.</p> <p>Demonstrate ability to create appropriate electrical circuits</p> <p>Demonstrate Ability to Solder</p> <p>Describe the role and scope of the Institute of Electrical and electronic Engineers.</p> <p>Calculate Ohms Law.</p> <p>Identify and describe the education requirements for Electrical Engineering profession.</p> <p>Identify various electrical components and their use, including: resistors, LEDS, Capacitors, motors, switches, potentiometers and breadboards.</p> <p>Clearly identify and practice electrical safety rules</p>	<p><u>Summative Assessment:</u></p> <ul style="list-style-type: none"> -Web Portfolio - Unit Project - Circuitry Design Challenge -Unit Reflection via Blog - Unit Test <p><u>Formative Assessment:</u></p> <ul style="list-style-type: none"> -Unit Quiz - Lab Safety Observations -Class discussions - Web Site Discussion Boards -Instructor Question and Answer Session - Laboratory Session Participation 	<p>NJ CCS 8.1 NJ CCS 8.2</p> <p>8.1.2.A.2 8.1.2.A.3 8.1.2.A.4 8.4.8.C.1 8.1.8.D.1 8.1.8.D.2 8.1.8.D.3 8.1.12.A.1 8.1.12.A.2 8.1.12.A.3 8.1.12.A.4 8.2.12.A.1 8.2.12.B.1 8.2.12.B.2 8.2.12.B.3 8.2.12.C.1 8.2.12.C.2 8.2.12.C.3 8.2.12.D.1 8.2.12.E.1 8.2.12.F.1 8.2.12.F.2 8.2.12.F.3 8.2.12.G.1</p>

UNIT 9: GREEN ENGINEERING

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
MP2	<p>What is Green Engineering?</p> <p>What Green Engineering careers are available?</p> <p>What are renewable and non-renewable resources?</p> <p>What are Floating cities?</p> <p>What are the Ethical issues of Green Engineering?</p> <p>Why had society become Environmentally Conscience? How?</p> <p>What is OPEC?</p> <p>What is Homasoate?</p> <p>What Resource and Recovery Design models</p>	<p><u>Instructional Strategies:</u></p> <ul style="list-style-type: none"> -Paperless class format -PowerPoint -Laboratory safety Laboratory learning experiences -Web Portfolio -Blog Postings -Student reflections -Class discussions - Field Trips- Resource and Recovery Homasoate Plant, West Trenton, NJ 	<p>Participate in the Resource and Recovery Field Trip.</p> <p>Participate in the Homasoate Field Trip.</p> <p>Describe the growing scope of Green Engineering.</p> <p>Describe the role OPEC plays in the economy and Green Engineering.</p> <p>Provide perspective on why society has become environmentally conscious.</p> <p>Describe the Resource and Recover Design Model.</p> <p>Describe the process and scope Homasoate creation.</p> <p>Identify various and emerging Green Engineering Fields.</p>	<p><u>Summative Assessment:</u></p> <ul style="list-style-type: none"> -Web Portfolio - Unit Project- Homasoate Design Challenge Unit Project- Resource and Recovery -Unit Reflection via Blog Field Trip Reflection <p><u>Formative Assessment:</u></p> <ul style="list-style-type: none"> -Unit Quiz - Lab Safety Observations -Class discussions - Web Site Discussion Boards -Instructor Question and Answer Session - Laboratory Session Participation 	<p>NJ CCS 8.1 NJ CCS 8.2</p> <p>8.1.2.A.2 8.4.8.C.1 8.1.8.D.1 8.1.8.D.2 8.1.8.D.3 8.1.12.A.1 8.1.12.A.2 8.1.12.A.3 8.1.12.A.4 8.2.12.A.1 8.2.12.B.1 8.2.12.B.2 8.2.12.B.3 8.2.12.C.2 8.2.12.C.3 8.2.12.D.1 8.2.12.E.1 8.2.12.F.1 8.2.12.F.2 8.2.12.F.3 8.2.12.G.1</p>

UNIT 10: CIVIL ENGINEERING

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
MP2	<p>What is the scope of a Civil Engineers work?</p> <p>What Structural Forces, loads and components are key understandings of Civil engineering?</p> <p>What are the various types of Bridges?</p> <p>What are the key understandings in the structure of a skyscraper?</p> <p>What is the purpose of land surveying</p>	<p><u>Instructional Strategies:</u></p> <ul style="list-style-type: none"> -Paperless class format -PowerPoint -Chapter 9 of Text -Laboratory safety Laboratory learning experiences -Web Portfolio -Blog Postings -Student reflections -Class discussions 	<p>Participate in structural force Design and testing.</p> <p>Describe in detail the scope of Civil Engineering work.</p> <p>Describe the various structural loads and forces essential to Civil engineering.</p> <p>Describe a variety of bridge designs and structural members of bridges.</p> <p>Describe various safety tests performed on existing bridges.</p> <p>Describe the role land surveyors play in Civil Engineering.</p> <p>Describe and Identify the key traits and understandings of Civil Engineering Careers.</p> <p>Identify the 100-point scale used to test bridges.</p>	<p><u>Summative Assessment:</u></p> <ul style="list-style-type: none"> -Web Portfolio - Unit Project- Structural force testing Bridge Design and Testing Project -Unit Reflection via Blog - Unit Test <p><u>Formative Assessment:</u></p> <ul style="list-style-type: none"> -Unit Quiz - Lab Safety Observations -Class discussions - Web Site Discussion Boards -Instructor Question and Answer Session - Laboratory Session Participation 	<p>NJ CCS 8.1 NJ CCS 8.2</p> <p>8.1.2.A.2 8.1.2.A.3 8.1.2.A.4 8.4.8.C.1 8.1.8.D.2 8.1.8.D.3 8.1.12.A.1 8.1.12.A.2 8.1.12.A.3 8.1.12.A.4 8.2.12.A.1 8.2.12.B.1 8.2.12.B.3 8.2.12.C.1 8.2.12.C.2 8.2.12.C.3 8.2.12.D.1 8.2.12.E.1 8.2.12.F.1 8.2.12.F.2 8.2.12.G.1</p>

UNIT 11: AEROSPACE ENGINEERING

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
MP2	<p>What is Aerospace Engineering?</p> <p>What are Newton's laws of Motion?</p> <p>What is the role of fluid mechanics and aerodynamics in Aerospace Engineering?</p> <p>What are the forces acting on an airplane in flight?</p> <p>What are Aerospace Engineering Examples?</p>	<p><u>Instructional Strategies:</u></p> <ul style="list-style-type: none"> -Paperless class format -PowerPoint -Video- Apollo 13 -Chapter 13 of Text -Laboratory safety Laboratory learning experiences -Web Portfolio -Blog Postings -Student reflections -Class discussions 	<p>Identify the role and scope of American Institute of Aeronautics and Astronautics. (AIAA)</p> <p>Newtown's three laws of motion and their impact on aerospace engineering.</p> <p>Fluid mechanics divided into roles- fluid dynamics and fluid statistics.</p> <p>Four forces acting on fixed wing aircraft; lift, thrust, drag, gravity.</p> <p>Divisions of Aircraft Design; aerodynamics, propulsion, stability and control and materials and structures.</p> <p>Demonstrate ability to design aircraft for maximum flight distance or height.</p>	<p><u>Summative Assessment:</u></p> <ul style="list-style-type: none"> -Web Portfolio - Unit Project- Aviation Design Challenge <p>Rocketry</p> <ul style="list-style-type: none"> -Unit Reflection via Blog <p><u>Formative Assessment:</u></p> <ul style="list-style-type: none"> -Unit Quiz - Lab Safety Observations -Class discussions - Web Site Discussion Boards -Instructor Question and Answer Session - Laboratory Session Participation - Worksheet Completion 	<p>NJ CCS 8.1 NJ CCS 8.2</p> <p>8.1.2.A.2 8.1.2.A.3 8.1.2.A.4 8.1.8.D.1 8.1.8.D.2 8.1.8.D.3 8.1.12.A.2 8.1.12.A.3 8.1.12.A.4 8.2.12.A.1 8.2.12.B.1 8.2.12.B.2 8.2.12.B.3 8.2.12.C.1 8.2.12.C.2 8.2.12.C.3 8.2.12.D.1 8.2.12.E.1 8.2.12.F.1 8.2.12.F.2 8.2.12.F.3 8.2.12.G.1</p>

UNIT 12: COMPUTER ENGINEERING

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
MP2	<p>What is Computer Engineering?</p> <p>What is the operation of Logic Gates?</p> <p>What is the purpose of Databases?</p> <p>How are Algorithms used?</p> <p>What are the Basic parts of computer?</p> <p>What is Binary Code?</p> <p>What are examples of Computer Engineering Applications?</p>	<p><u>Instructional Strategies:</u></p> <ul style="list-style-type: none"> -Paperless class format -PowerPoint -Chapter 12 of Text -Laboratory safety Laboratory learning experiences -Web Portfolio -Blog Postings -Student reflections -Class discussions 	<p>Identify the courses that are required to achieve degree in Computer Engineering.</p> <p>Describe the process of binary code in digital and electronic devices.</p> <p>Describe how algorithms are used to design computer programs in addition to completing other tasks.</p> <p>Effectively communicate information using binary code.</p> <p>Demonstrate knowledge digital electronic decision making via logic gates.</p> <p>Demonstrate computer architecture focusing on physical and software design with cost parameters.</p>	<p><u>Summative Assessment:</u></p> <ul style="list-style-type: none"> -Web Portfolio - Unit Project- Test on Binary code and Algorithms Design Personal computer with Cost Parameters -Unit Reflection via Blog <p><u>Formative Assessment:</u></p> <ul style="list-style-type: none"> - Lab Safety Observations -Class discussions - Web Site Discussion Boards -Instructor Question and Answer Session - Laboratory Session Participation 	<p>NJ CCS 8.1 NJ CCS 8.2</p> <p>8.1.2.A.2 8.1.2.A.3 8.1.2.A.4 8.4.8.C.1 8.1.8.D.2 8.1.8.D.3 8.1.12.A.1 8.1.12.A.2 8.1.12.A.3 8.1.12.A.4 8.2.12.A.1 8.2.12.B.1 8.2.12.B.2 8.2.12.B.3 8.2.12.C.1 8.2.12.C.2 8.2.12.C.3 8.2.12.D.1 8.2.12.E.1 8.2.12.F.1 8.2.12.F.2 8.2.12.G.1</p>

UNIT 13: CHEMICAL ENGINEERING

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
MP2	<p>What is Chemical Engineering?</p> <p>What is difference between chemical engineering and chemistry?</p> <p>What are the Laws of thermodynamics and how are they used in chemical engineering ?</p> <p>What are the various types of measurements used in Chemical Engineering?</p> <p>What is OSHA?</p> <p>What is OSHA role?</p> <p>How is Mass balance used to analyze chemical processes?</p>	<p><u>Instructional Strategies:</u></p> <ul style="list-style-type: none"> -Paperless class format -PowerPoint -Guest Speaker -Chapter 15 of Text -Laboratory safety Laboratory learning experiences -Web Portfolio -Blog Postings -Student reflections -Class discussions 	<p>Identify and explain the role of the Occupational Safety and Health Administration. (OSHA)</p> <p>Explain how thermodynamics explore the change of energy into work and heat.</p> <p>Describe how mass balance is used to ensure the same amount of materials in equal the same of amount of materials out.</p> <p>Identify and describe the measurements in chemical engineering.</p> <p>Identify and explain the role of American Institute of Chemical Engineers. (AIChE)</p> <p>Explain the understanding of gas and liquid motion, known as fluid dynamics.</p>	<p><u>Assessment:</u></p> <ul style="list-style-type: none"> -Web Portfolio -Unit Reflection via Blog - Unit Test <p><u>Formative Assessment:</u></p> <ul style="list-style-type: none"> -Unit Quiz - Lab Safety Observations -Class discussions - Web Site Discussion Boards -Instructor Question and Answer Session - Laboratory Session Participation 	<p>NJ CCS 8.1 NJ CCS 8.2</p> <p>8.1.2.A.2 8.1.2.A.4 8.4.8.C.1 8.1.8.D.1 8.1.8.D.2 8.1.8.D.3 8.1.12.A.1 8.1.12.A.2 8.1.12.A.3 8.1.12.A.4 8.2.12.B.1 8.2.12.B.2 8.2.12.B.3 8.2.12.C.1 8.2.12.C.2 8.2.12.C.3 8.2.12.D.1 8.2.12.E.1 8.2.12.F.1 8.2.12.F.3 8.2.12.G.1</p>

UNIT 14: MECHANICAL ENGINEERING

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
MP3	<p>What is Mechanical Engineering?</p> <p>What is the concept of energy, motion and simple machines?</p> <p>What are the components of Mechanical and Fluid power systems?</p> <p>What are Mechanical power and mechanical advantage?</p> <p>What are examples of Mechanical Engineering applications?</p> <p>What are classes of Levers?</p> <p>What are Mechanical Engineering Careers?</p>	<p><u>Instructional Strategies:</u></p> <ul style="list-style-type: none"> -Paperless class format -PowerPoint -Video-Simple Machines -Guest Speaker -Chapter 10 of Text -Laboratory safety -Laboratory learning experience -Web Portfolio -Blog Postings -Student reflections -Class discussions 	<p>Describe the scope of fluid mechanics and mechanical advantage.</p> <p>Identify classes of levers and their common uses.</p> <p>Identify common and Emerging Mechanical engineering fields.</p> <p>Describe the application of fluid mechanics including hydraulics and pneumatics.</p> <p>Describe the application of Pascal's law applies to Mechanical Engineering.</p> <p>Explore gear and pulley reduction and advantages.</p> <p>Describe and define torque, hydraulic systems, rotary motion, actuators and energy.</p>	<p><u>Summative Assessment:</u></p> <ul style="list-style-type: none"> -Web Portfolio -Unit Reflection via Blog -Unit Test <p><u>Formative Assessment:</u></p> <ul style="list-style-type: none"> -Lab Safety Observations -Class discussions -Web Site -Discussion Boards -Instructor Question and Answer Session -Laboratory Session Participation -Worksheet Completion 	<p>NJ CCS 8.1 NJ CCS 8.2</p> <p>8.1.2.A.2 8.1.2.A.3 8.1.2.A.4 8.4.8.C.1 8.1.8.D.3 8.1.12.A.1 8.1.12.A.2 8.1.12.A.3 8.1.12.A.4 8.2.12.A.1 8.2.12.B.1 8.2.12.B.3 8.2.12.C.1 8.2.12.C.2 8.2.12.C.3 8.2.12.D.1 8.2.12.E.1 8.2.12.F.1 8.2.12.F.2 8.2.12.F.3 8.2.12.G.1</p>

UNIT 15: ENGINEERING GRAPHICS - PTC/CREO

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
MP 3-4	<p>What is CAD?</p> <p>What is CAM?</p> <p>What is PTC?</p> <p>What is PTC/CREO?</p> <p>How are geometric features and models edited and created?</p> <p>What is the function of each PTC/CREO tool?</p> <p>What is the PTC/CREO Basic modeling Process?</p> <p>What are the PTC/CREO parametric concepts?</p> <p>How is PTC/Creo Parametric Interfaced?</p> <p>How is Sketcher Geometry created?</p> <p>How are Datum Features Created?</p> <p>How are Extrudes Created?</p>	<p><u>Instructional Strategies:</u></p> <ul style="list-style-type: none"> -Paperless class format -PowerPoint -Laboratory safety Laboratory learning experiences -Web Portfolio -Blog Postings -Student reflections -Class discussions 	<p><u>PTC/CREO Basic parametric Process:</u></p> <p>Understanding solid modeling concepts</p> <p>Understanding Feature-based Concepts</p> <p>Understanding parametric Concepts</p> <p>Understanding Associative Concepts</p> <p>Understanding Model - Centric-Concepts.</p> <p>Identifying appropriate file extensions</p> <p><u>Using Creo Parametric interface</u></p> <p>Understanding Main interface with folder browser.</p> <p>Understanding Ribbon Interface with customization.</p> <p>Understanding Datum Display options.</p> <p>Understanding 3-D orientations.</p>	<p><u>Assessment:</u></p> <p>-Web Portfolio</p> <p>- Unit Projects-</p> <ul style="list-style-type: none"> <input type="checkbox"/> Air Circulator <input type="checkbox"/> Piston Assembly Components <p>-Unit Reflection via Blog</p> <p>Unit tests</p> <p><u>Formative Assessment:</u></p> <p>-Projects:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Crankshaft. <input type="checkbox"/> Engine block <input type="checkbox"/> Soccer stadium <input type="checkbox"/> Impeller <input type="checkbox"/> Impeller housing <input type="checkbox"/> Chess Piece <input type="checkbox"/> Tower of Hanoi Modeling 	<p>NJ CCS 8.1</p> <p>NJ CCS 8.2</p> <p>8.1.2.A.2</p> <p>8.1.2.A.3</p> <p>8.1.2.A.4</p> <p>8.4.8.C.1</p> <p>8.1.8.D.1</p> <p>8.1.8.D.2</p> <p>8.1.8.D.3</p> <p>8.1.12.A.1</p> <p>8.1.12.A.2</p> <p>8.1.12.A.3</p> <p>8.1.12.A.4</p> <p>8.2.12.A.1</p> <p>8.2.12.B.1</p> <p>8.2.12.B.2</p> <p>8.2.12.B.3</p> <p>8.2.12.C.1</p> <p>8.2.12.C.2</p> <p>8.2.12.C.3</p> <p>8.2.12.D.1</p> <p>8.2.12.E.1</p> <p>8.2.12.F.1</p> <p>8.2.12.F.2</p> <p>8.2.12.F.3</p> <p>8.2.12.G.1</p>

UNIT 15: ENGINEERING GRAPHICS - PTC/CREO (CONT.)

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
MP 4	<p>What is the Process to create Revolves?</p> <p>How are internal sketches and embedded Datums used?</p> <p>What is process for creating sweeps and blends?</p> <p>How are holes, shells and drafts created?</p> <p>What are rounds and chamfers and how are they created?</p> <p>How are mirror and group copy tools utilized?</p> <p>How are measuring and Inspecting Models used?</p> <p>What is the process of creating patterns?</p> <p>How is assembly with Constraints accomplished?</p>		<p>Creating styles, states using view manager.</p> <p>Managing and editing Appearances.</p> <p>Setting up new Part Models.</p> <p><u>Selecting Geometry, Features and Models.</u></p> <p>Understanding Creo Parametric Controls.</p> <p>Using Drag handles and dimension draggers.</p> <p>Using Shortcuts on keyboard.</p> <p>Using Model tree and Model Tree Filters.</p> <p>Understanding Model Tree Columns</p> <p>Using Search Filter and renaming objects.</p>	<p><input type="checkbox"/> Mouse Modeling</p> <p><input type="checkbox"/> Chemical Engineering pipeline</p> <p><input type="checkbox"/> Cell phone Design</p> <p><input type="checkbox"/> Toothbrush Design</p> <p>- Lab Safety Observations</p> <p>-Class discussions</p> <p>- Web Site Discussion Boards</p> <p>-Instructor Question and Answer Session</p> <p>- Laboratory Session Participation</p> <p>- Worksheet Completion</p>	

UNIT 15: ENGINEERING GRAPHICS - PTC/CREO (CONT.)

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
	<p>What is the process of assembling with connections?</p> <p>How are exploding assemblies created?</p> <p>How are drawing layouts and views with annotations utilized?</p> <p>How is managing design intent utilized?</p> <p>What outputs are possible via Creo?</p> <p>What is Makerbot?</p> <p>What is Replicator 2.0.</p> <p>What is prototyping?</p> <p>How is Prototyping utilized in Engineering Design?</p>		<p><u>Editing Geometry, Features and Models</u> Understanding Regeneration vs. Auto Generation</p> <p>Understanding Feature and Component Visibility.</p> <p><u>Creating Sketcher Geometry.</u> Understanding Sketcher Theory.</p> <p>Understanding Design Intent.</p> <p>Utilization of constraints.</p> <p>Understanding Sketcher on-the-fly constraints.</p> <p>Understanding sketcher: lines, centerlines, rectangles, parallelograms, circles, arcs, circular fillets, chamfers.</p> <p>Using sketcher Tools. Understanding Constructive Geometry Theory. Manipulating sketches and</p>		

UNIT 15: ENGINEERING GRAPHICS - PTC/CREO (CONT.)

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
			<p>Dimensioning entities.</p> <p>Sketcher conflicts with sketcher sectioning.</p> <p><u>Creating Sketches for Features.</u> Understanding and manipulating Sketch makeup/setup.</p> <p>Utilizing sketch references. Using Entity from edges within sketcher.</p> <p>Understanding thinking edges</p> <p><u>Creating Extrudes, Revolves and Ribs.</u> Creating Solid Extrude Features. Adding Taper to Extrudes. Understanding Dashboard options; extrude depth, feature direction, thicken sketch.</p> <p>Understanding rib features.</p> <p>Understanding revolve and revolve angles</p>		

UNIT 15: ENGINEERING GRAPHICS - PTC/CREO (CONT.)

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
			<p><u>Utilizing internal Sketches and Embedded Datums.</u> Creating internal Sketches</p> <p>Creating Embedded Datum Sketches.</p> <p><u>Creating Sweeps and blends.</u> Creating sweeps with open and closed trajectories.</p> <p>Analyzing sweep feature attributes.</p> <p>Creating blends by selecting sketches or parallel sections.</p> <p>Analyzing Blend Options.</p> <p><u>Creating Holes, Shells and Drafts.</u> Common Dashboard options; hole depth, coaxial holes, linear holes, radial and diameter holes.</p> <p>Exploring hole profile options.</p>		

UNIT 15: ENGINEERING GRAPHICS - PTC/CREO (CONT.)

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
			<p>Creating Shell features.</p> <p>Creating draft split and hinge features.</p> <p><u>Creating Rounds and Chamfers.</u> Theory of Rounds. Creating Rounds, surface, surface and edge, full rounds, sets.</p> <p>Creating Chamfers, by selecting edges.</p> <p>Chamfer dimensioning schemes.</p> <p><u>Group Copy and Mirror Tools.</u> Creating local groups. Rotating copied features.</p> <p>Moving rotated copied features.</p> <p>Mirroring selected features and parts.</p> <p><u>Creating Patterns.</u> Understanding Directional Patterning.</p>		

UNIT 15: ENGINEERING GRAPHICS - PTC/CREO (CONT.)

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
			<p><u>Creating Patterns.</u> Understanding Axis Patterning.</p> <p>Creating reference patterns and components.</p> <p><u>Measurement and Inspection Tools.</u> Understanding and investigating; model properties, mass properties, measure tools, model units and planar part cross sections.</p> <p>Measuring global interface.</p> <p><u>Assembling with Constraints and Connections.</u> Understanding Assembly and connection theory.</p> <p>Understanding Creating, assembly models, components using slider connection, pin connection, datum features, angle constraints.</p> <p>Analyzing collision direction settings.</p> <p><u>Exploding Assemblies.</u> Creating and managing explode states</p>		

UNIT 15: ENGINEERING GRAPHICS - PTC/CREO (CONT.)

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
			<p><u>Exploding Assemblies.</u> Creating explode lines Animating explode states.</p> <p><u>Drawing layout and views.</u> Analyzing drawing concepts and theory. Applying formats Understanding creating; orientation views, general views, projection views, cross section views, detailed views, auxiliary views, assembly and exploded views. Utilization of drawing tree and templates.</p> <p><u>Creating Drawing annotations.</u> Creating and inserting; notes, dimensions, cleanups, publishing.</p> <p><u>Using Layers.</u> Understanding layer theory. Creating and managing layers. Utilization of layering assembly models.</p>		

UNIT 15: ENGINEERING GRAPHICS - MAKERBOT REPLICATOR 2.0 - PROTOTYPING WITH PTC/CREO

Month	Essential/Supporting Questions	Content	Skills/Concepts	Assessment	Standards
MP 3-4	<p>What is CAM?</p> <p>What is Makerbot Replicator 2.0?</p> <p>How do Engineers Utilize 3D prototyping?</p> <p>What is an STL file?</p> <p>What is milling?</p> <p>What Is Micron Layer Resolution?</p> <p>What is filament?</p> <p>What are the professional engineering benefits of 3D modeling and prototyping?</p> <p>How will PTC/CREO configure with Makerbot?</p>	<p><u>Instructional Strategies:</u></p> <ul style="list-style-type: none"> -Paperless class format -PowerPoint -Video-Safety -Chapter 14 of Text -Laboratory safety Laboratory learning experiences -Web Portfolio -Blog Postings -Student reflections -Class discussions 	<p>Define Prototyping.</p> <p>Define and demonstrate ability to safely setup and utilize Makerbot 2.0.</p> <p>Define STL files.</p> <p>Describe and observe milling and rasterizing.</p> <p>Describe the scope of 3D prototyping in the field of Engineering.</p> <p>Define filament and how utilized in Makerbot prototyping.</p> <p>Describe the scope of configuring Makerbot with PTC/Creo.</p> <p>Demonstrable ability to produce unique design and 3Dimensional Prototype</p>	<p><u>Summative Assessment:</u></p> <ul style="list-style-type: none"> -Web Portfolio -Unit Project-Design Challenges -Unit Reflection via Blog -Unit test <p><u>Formative Assessment:</u></p> <ul style="list-style-type: none"> -Unit Quiz -Lab Safety Observations -Class discussions -Web Site Discussion Boards -Instructor Question and Answer Session -Laboratory Session Participation 	<p>NJ CCS 8.1</p> <p>NJ CCS 8.2</p> <p>8.1.2.A.2</p> <p>8.1.2.A.3</p> <p>8.1.2.A.4</p> <p>8.4.8.C.1</p> <p>8.1.8.D.3</p> <p>8.1.12.A.1</p> <p>8.1.12.A.2</p> <p>8.1.12.A.3</p> <p>8.1.12.A.4</p> <p>8.2.12.A.1</p> <p>8.2.12.B.1</p> <p>8.2.12.B.3</p> <p>8.2.12.C.1</p> <p>8.2.12.C.2</p> <p>8.2.12.C.3</p> <p>8.2.12.D.1</p> <p>8.2.12.E.1</p> <p>8.2.12.F.1</p> <p>8.2.12.F.2</p> <p>8.2.12.F.3</p> <p>8.2.12.G.1</p>

2014 New Jersey Core Curriculum Content Standards - Technology

Content Area		Technology	
Standard		8.1 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.	
Strand		A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.	
Grade Level bands	Content Statement Students will:	Indicator	Indicator
P	Understand and use technology systems.	8.1.P.A.1	Use an input device to select an item and navigate the screen
		8.1.P.A.2	Navigate the basic functions of a browser.
	Select and use applications effectively and productively.	8.1.P.A.3	Use digital devices to create stories with pictures, numbers, letters and words.
		8.1.P.A.4	Use basic technology terms in the proper context in conversation with peers and teachers (e.g., camera, tablet, Internet, mouse, keyboard, and printer).
		8.1.P.A.5	Demonstrate the ability to access and use resources on a computing device.
K-2	Understand and use technology systems.	8.1.2.A.1	Identify the basic features of a digital device and explain its purpose.
		8.1.2.A.2	Create a document using a word processing application.
	Select and use applications effectively and productively.	8.1.2.A.3	Compare the common uses of at least two different digital applications and identify the advantages and disadvantages of using each.
		8.1.2.A.4	Demonstrate developmentally appropriate navigation skills in virtual environments (i.e. games, museums).
		8.1.2.A.5	Enter information into a spreadsheet and sort the information.
		8.1.2.A.6	Identify the structure and components of a database.
		8.1.2.A.7	Enter information into a database or spreadsheet and filter the information.
3-5	Understand and use technology systems.	8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
		8.1.5.A.2	Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
	Select and use applications effectively and productively.	8.1.5.A.3	Use a graphic organizer to organize information about problem or issue.
		8.1.5.A.4	Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.
		8.1.5.A.5	Create and use a database to answer basic questions.
		8.1.5.A.6	Export data from a database into a spreadsheet; analyze and produce a report that explains the analysis of the data.

2014 New Jersey Core Curriculum Content Standards - Technology

Content Area		Technology	
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Strand		A. Technology Operations and Concepts: <i>Students demonstrate a sound understanding of technology concepts, systems and operations.</i>	
Grade Level bands	Content Statement Students will:	Indicator	Indicator
6-8	Understand and use technology systems.	8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
	Select and use applications effectively and productively.	8.1.8.A.2	Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
		8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
		8.1.8.A.4	Graph and calculate data within a spreadsheet and present a summary of the results
		8.1.8.A.5	Create a database query, sort and create a report and describe the process, and explain the report results.
9-12	Understand and use technology systems.	8.1.12.A.1	Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
	Select and use applications effectively and productively.	8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
		8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
		8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.
		8.1.12.A.5	Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.

2014 New Jersey Core Curriculum Content Standards - Technology

Content Area		Technology	
Standard		8.1 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.	
Strand		B. Creativity and Innovation: <i>Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.</i>	
Grade Level bands	Content Statement Students will:	Indicator	Indicator
P	Apply existing knowledge to generate new ideas, products, or processes.	8.1.P.B.1	Create a story about a picture taken by the student on a digital camera or mobile device.
K-2		8.1.2.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources .
3-5	Create original works as a means of personal or group expression.	8.1.5.B.1	Collaborative to produce a digital story about a significant local event or issue based on first-person interviews.
6-8		8.1.8.B.1	Synthesize and publish information about a local or global issue or event (ex. telecollaborative project, blog, school web).
9-12		8.1.12.B.2	Apply previous content knowledge by creating and piloting a digital learning game or tutorial.

Content Area		Technology	
Standard		8.1 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.	
Strand		C. Communication and Collaboration: <i>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.</i>	
Gr.Level Bands	Content Statement	Indicator	Indicator
P	Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.	8.1.P.C.1	Collaborate with peers by participating in interactive digital games or activities.
K-2		Communicate information and ideas to multiple audiences using a variety of media and formats.	8.1.2.C.1
3-5	Develop cultural understanding and global awareness by engaging with learners of other cultures.		8.1.5.C.1
6-8		Contribute to project teams to produce original works or solve problems.	8.1.8.C.1
9-12	8.1.12.C.1		Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.

2014 New Jersey Core Curriculum Content Standards - Technology

Content Area		Technology	
Standard		8.1 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.	
Strand		D. Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.	
Grade Level bands	Content Statement	Indicator	Indicator
K-2	Advocate and practice safe, legal, and responsible use of information and technology.	8.1.2.D.1	Develop an understanding of ownership of print and nonprint information.
3-5	Advocate and practice safe, legal, and responsible use of information and technology.	8.1.5.D.1	Understand the need for and use of copyrights.
		8.1.5.D.2	Analyze the resource citations in online materials for proper use.
	Demonstrate personal responsibility for lifelong learning.	8.1.5.D.3	Demonstrate an understanding of the need to practice cyber safety, cyber security, and cyber ethics when using technologies and social media.
	Exhibit leadership for digital citizenship.	8.1.5.D.4	Understand digital citizenship and demonstrate an understanding of the personal consequences of inappropriate use of technology and social media.
6-8	Advocate and practice safe, legal, and responsible use of information and technology.	8.1.8.D.1	Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
	Demonstrate personal responsibility for lifelong learning.	8.1.8.D.2	Demonstrate the application of appropriate citations to digital content.
		8.1.8.D.3	Demonstrate an understanding of fair use and Creative Commons to intellectual property.
	Exhibit leadership for digital citizenship.	8.1.8.D.4	Assess the credibility and accuracy of digital content.
		8.1.8.D.5	Understand appropriate uses for social media and the negative consequences of misuse.
9-12	Advocate and practice safe, legal, and responsible use of information and technology.	8.1.12.D.1	Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.
	Demonstrate personal responsibility for lifelong learning.	8.1.12.D.2	Evaluate consequences of unauthorized electronic access (e.g., hacking) and disclosure, and on dissemination of personal information.
		8.1.12.D.3	Compare and contrast policies on filtering and censorship both locally and globally.
	Exhibit leadership for digital citizenship.	8.1.12.D.4	Research and understand the positive and negative impact of one's digital footprint.
		8.1.12.D.5	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.

2014 New Jersey Core Curriculum Content Standards - Technology

Content Area		Technology	
Standard		8.1 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.	
Strand		E: Research and Information Fluency: <i>Students apply digital tools to gather, evaluate, and use information.</i>	
Gr.Level bands	Content Statement Students will:	Indicator	Indicator
P	Plan strategies to guide inquiry.	8.1.P.E.1	Use the Internet to explore and investigate questions with a teacher's support.
K-2	Plan strategies to guide inquiry Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.	8.1.2.E.1	Use digital tools and online resources to explore a problem or issue.
3-5	Plan strategies to guide inquiry. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.	8.1.5.E.1	Use digital tools to research and evaluate the accuracy of, relevance to, and appropriateness of using print and non-print electronic information sources to complete a variety of tasks.
6-8	Plan strategies to guide inquiry. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. Evaluate and select information sources and digital tools based on the appropriateness for specific tasks. Process data and report results.	8.1.8.E.1	Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.
9-12	Plan strategies to guide inquiry. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. Evaluate and select information sources and digital tools based on the appropriateness for specific tasks. Process data and report results.	8.1.12.E.1	Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.
		8.1.12.E.2	Research and evaluate the impact on society of the unethical use of digital tools and present your research to peers.

2014 New Jersey Core Curriculum Content Standards - Technology

Content Area	Technology		
Standard	8.1 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.		
Strand	F: Critical thinking, problem solving, and decision making: <i>Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.</i>		
Grade Level bands	Content Statement Students will:	Indicator	Indicator
K-2	Identify and define authentic problems and significant questions for investigation. Plan and manage activities to develop a solution or complete a project. Collect and analyze data to identify solutions and/or make informed decisions. Use multiple processes and diverse perspectives to explore alternative solutions.	8.1.2.F.1	Use geographic mapping tools to plan and solve problems.
3-5	Identify and define authentic problems and significant questions for investigation. Plan and manage activities to develop a solution or complete a project. Collect and analyze data to identify solutions and/or make informed decisions. Use multiple processes and diverse perspectives to explore alternative solutions	8.1.5.F.1	Apply digital tools to collect, organize, and analyze data that support a scientific finding.
6-8	Identify and define authentic problems and significant questions for investigation. Plan and manage activities to develop a solution or complete a project. Collect and analyze data to identify solutions and/or make informed decisions. Use multiple processes and diverse perspectives to explore alternative solutions.	8.1.8.F.1	Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.

2014 New Jersey Core Curriculum Content Standards - Technology

Content Area	Technology		
Standard	8.1 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.		
Strand	F: Critical thinking, problem solving, and decision making: <i>Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.</i>		
Grade Level bands	Content Statement Students will:	Indicator	Indicator
9-12	Identify and define authentic problems and significant questions for investigation. Plan and manage activities to develop a solution or complete a project. Collect and analyze data to identify solutions and/or make informed decisions. Use multiple processes and diverse perspectives to explore alternative solutions.	8.1.12.F.1	Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

2014 New Jersey Core Curriculum Content Standards - Technology

Content Area		Technology	
Standard		8.2 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.	
Strand		A. The Nature of Technology: Creativity and Innovation <i>Technology systems impact every aspect of the world in which we live.</i>	
Grade Level bands	Content Statement Students will be able to understand:	Indicator	Indicator
K-2	The characteristics and scope of technology.	8.2.2.A.1	Define products produced as a result of technology or of nature.
		8.2.2.A.2	Describe how designed products and systems are useful at school, home and work.
	The core concepts of technology.	8.2.2.A.3	Identify a system and the components that work together to accomplish its purpose.
		8.2.2.A.4	Choose a product to make and plan the tools and materials needed.
	The relationships among technologies and the connections between technology and other fields of study.	8.2.2.A.5	Collaborate to design a solution to a problem affecting the community.
3-5	The characteristics and scope of technology.	8.2.5.A.1	Compare and contrast how products made in nature differ from products that are human made in how they are produced and used.
		8.2.5.A.2	Investigate and present factors that influence the development and function of a product and a system.
	The core concepts of technology.	8.2.5.A.3	Investigate and present factors that influence the development and function of products and systems, e.g., resources, criteria and constraints.
		The relationships among technologies and the connections between technology and other fields of study.	8.2.5.A.4
	8.2.5.A.5		Identify how improvement in the understanding of materials science impacts technologies.

2014 New Jersey Core Curriculum Content Standards - Technology

Content Area	Technology		
Standard	8.2 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.		
Strand	A. The Nature of Technology: Creativity and Innovation <i>Technology systems impact every aspect of the world in which we live.</i>		
Grade Level bands	Content Statement Students will be able to understand:	Indicator	Indicator
6-8	The characteristics and scope of technology.	8.2.8.A.1	Research a product that was designed for a specific demand and identify how the product has changed to meet new demands (i.e. telephone for communication - smart phone for mobility needs).
	The core concepts of technology.	8.2.8.A.2	Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.
		8.2.8.A.3	Investigate a malfunction in any part of a system and identify its impacts.
	The relationships among technologies and the connections between technology and other fields of study.	8.2.8.A.4	Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.
		8.2.8.A.5	Describe how resources such as material, energy, information, time, tools, people, and capital contribute to a technological product or system.
9-12	The characteristics and scope of technology.	8.2.12.A.1	Propose an innovation to meet future demands supported by an analysis of the potential full costs, benefits, trade-offs and risks, related to the use of the innovation.
	The core concepts of technology.	8.2.12.A.2	Analyze a current technology and the resources used, to identify the trade-offs in terms of availability, cost, desirability and waste.
	The relationships among technologies and the connections between technology and other fields of study.	8.2.12.A.3	Research and present information on an existing technological product that has been repurposed for a different function.

2014 New Jersey Core Curriculum Content Standards - Technology

Content Area	Technology		
Standard	8.2 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.		
Strand	B. Technology and Society: <i>Knowledge and understanding of human, cultural and societal values are fundamental when designing technological systems and products in the global society.</i>		
Grade Level bands	Content Statement Students will be able to understand:	Indicator	Indicator
K-2	The cultural, social, economic and political effects of technology.	8.2.2.B.1	Identify how technology impacts or improves life.
	The effects of technology on the environment.	8.2.2.B.2	Demonstrate how reusing a product affects the local and global environment.
	The role of society in the development and use of technology.	8.2.2.B.3	Identify products or systems that are designed to meet human needs.
	The influence of technology on history.	8.2.2.B.4	Identify how the ways people live and work has changed because of technology.
3-5	The cultural, social, economic and political effects of technology.	8.2.5.B.1	Examine ethical considerations in the development and production of a product through its life cycle.
	The effects of technology on the environment.	8.2.5.B.2	Examine systems used for recycling and recommend simplification of the systems and share with product developers.
		8.2.5.B.3	Investigate ways that various technologies are being developed and used to reduce improper use of resources.
	The role of society in the development and use of technology.	8.2.5.B.4	Research technologies that have changed due to society's changing needs and wants.
		8.2.5.B.5	Explain the purpose of intellectual property law.
	The influence of technology on history.	8.2.5.B.6	Compare and discuss how technologies have influenced history in the past century.

2014 New Jersey Core Curriculum Content Standards - Technology

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Strand		B. Technology and Society: <i>Knowledge and understanding of human, cultural and societal values are fundamental when designing technological systems and products in the global society.</i>	
Grade Level bands	Content Statement Students will be able to understand:	Indicator	Indicator
6-8	The cultural, social, economic and political effects of technology.	8.2.8.B.1	Evaluate the history and impact of sustainability on the development of a designed product or system over time and present results to peers.
		8.2.8.B.2	Identify the desired and undesired consequences from the use of a product or system.
	The effects of technology on the environment.	8.2.8.B.3	Research and analyze the ethical issues of a product or system on the environment and report findings for review by peers and /or experts.
		8.2.8.B.4	Research examples of how humans can devise technologies to reduce the negative consequences of other technologies and present your findings.
	The role of society in the development and use of technology.	8.2.8.B.5	Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries and societies.
		8.2.8.B.6	Compare and contrast the different types of intellectual property including copyrights, patents and trademarks.
	The influence of technology on history.	8.2.8.B.7	Analyze the historical impact of waste and demonstrate how a product is upcycled, reused or remanufactured into a new product.
9-12	The cultural, social, economic and political effects of technology.	8.2.12.B.1	Research and analyze the impact of the design constraints (specifications and limits) for a product or technology driven by a cultural, social, economic or political need and publish for review.
	The effects of technology on the environment.	8.2.12.B.2	Evaluate ethical considerations regarding the sustainability of environmental resources that are used for the design, creation and maintenance of a chosen product.
	The role of society in the development and use of technology.	8.2.12.B.3	Analyze ethical and unethical practices around intellectual property rights as influenced by human wants and/or needs.
	The influence of technology on history.	8.2.12.B.4	Investigate a technology used in a given period of history, e.g., stone age, industrial revolution or information age, and identify their impact and how they may have changed to meet human needs and wants.
		8.2.12.B.5	Research the historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product, and present the competing viewpoints to peers for review.

2014 New Jersey Core Curriculum Content Standards - Technology

Content Area		Technology	
Standard		8.2 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.	
Strand		C. Design: <i>The design process is a systematic approach to solving problems.</i>	
Grade Level bands	Content Statement Students will be able to understand:	Indicator	Indicator
K-2	The attributes of design.	8.2.2.C.1	Brainstorm ideas on how to solve a problem or build a product.
		8.2.2.C.2	Create a drawing of a product or device that communicates its function to peers and discuss.
		8.2.2.C.3	Explain why we need to make new products.
	The application of engineering design.	8.2.2.C.4	Identify designed products and brainstorm how to improve one used in the classroom.
		8.2.2.C.5	Describe how the parts of a common toy or tool interact and work as part of a system.
	The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.	8.2.2.C.6	Investigate a product that has stopped working and brainstorm ideas to correct the problem.
3-5	The attributes of design.	8.2.5.C.1	Collaborate with peers to illustrate components of a designed system.
		8.2.5.C.2	Explain how specifications and limitations can be used to direct a product's development.
		8.2.5.C.3	Research how design modifications have lead to new products.
	The application of engineering design.	8.2.5.C.4	Collaborate and brainstorm with peers to solve a problem evaluating all solutions to provide the best results with supporting sketches or models.
		8.2.5.C.5	Explain the functions of a system and subsystems.
	The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.	8.2.5.C.6	Examine a malfunctioning tool and identify the process to troubleshoot and present options to repair the tool.
		8.2.5.C.7	Work with peers to redesign an existing product for a different purpose.

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Strand		C. Design: <i>The design process is a systematic approach to solving problems.</i>	
Gr.Level bands	Content Statement SWBAT understand:	Indicator	Indicator
6-8	The attributes of design.	8.2.8.C.1	Explain how different teams/groups can contribute to the overall design of a product.
		8.2.8.C.2	Explain the need for optimization in a design process.
		8.2.8.C.3	Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
	The application of engineering design.	8.2.8.C.4	Identify the steps in the design process that would be used to solve a designated problem.
		8.2.8.C.5	Explain the interdependence of a subsystem that operates as part of a system.
		8.2.8.C.5.a	Create a technical sketch of a product with materials and measurements labeled.
	The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.	8.2.8.C.6	Collaborate to examine a malfunctioning system and identify the step-by-step process used to troubleshoot, evaluate and test options to repair the product, presenting the better solution.
		8.2.8.C.7	Collaborate with peers and experts in the field to research and develop a product using the design process, data analysis and trends, and maintain a design log with annotated sketches to record the developmental cycle.
8.2.8.C.8		Develop a proposal for a chosen solution that include models (physical, graphical or mathematical) to communicate the solution to peers.	
9-12	The attributes of design.	8.2.12.C.1	Explain how open source technologies follow the design process.
		8.2.12.C.2	Analyze a product and how it has changed or might change over time to meet human needs and wants.
	The application of engineering design.	8.2.12.C.3	Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors engineering (ergonomics).
		8.2.12.C.4	Explain and identify interdependent systems and their functions.
		8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
	The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.	8.2.12.C.6	Research an existing product, reverse engineer and redesign it to improve form and function.
		8.2.12.C.7	Use a design process to devise a technological product or system that addresses a global problem, provide research, identify trade-offs and constraints, and document the process through drawings that include data and materials.

2014 New Jersey Core Curriculum Content Standards - Technology

Content Area		Technology	
Standard		8.2 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.	
Strand		D. Abilities for a Technological World: <i>The designed world is the product of a design process that provides the means to convert resources into products and systems.</i>	
Grade Level bands	Content Statement Students will understand how to:	Indicator	Indicator
K-2	Apply the design process.	8.2.2.D.1	Collaborate and apply a design process to solve a simple problem from everyday experiences.
	Use and maintain technological products and systems.	8.2.2.D.2	Discover how a product works by taking it apart, sketching how parts fit, and putting it back together.
		8.2.2.D.3	Identify the strengths and weaknesses in a product or system.
		8.2.2.D.4	Identify the resources needed to create technological products or systems.
	Assess the impact of products and systems.	8.2.2.D.5	Identify how using a tool (such as a bucket or wagon) aids in reducing work.
3-5	Apply the design process.	8.2.5.D.1	Identify and collect information about a problem that can be solved by technology, generate ideas to solve the problem, and identify constraints and trade-offs to be considered.
		8.2.5.D.2	Evaluate and test alternative solutions to a problem using the constraints and trade-offs identified in the design process to evaluate potential solutions.
	Use and maintain technological products and systems.	8.2.5.D.3	Follow step by step directions to assemble a product or solve a problem.
		8.2.5.D.4	Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.
		8.2.5.D.5	Describe how resources such as material, energy, information, time, tools, people and capital are used in products or systems.
	Assess the impact of products and systems.	8.2.5.D.6	Explain the positive and negative effect of products and systems on humans, other species and the environment, and when the product or system should be used.
		8.2.5.D.7	Explain the impact that resources such as energy and materials used in a process to produce products or system have on the environment.

2014 New Jersey Core Curriculum Content Standards - Technology

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Strand		D. Abilities for a Technological World: <i>The designed world is the product of a design process that provides the means to convert resources into products and systems.</i>	
Grade Level bands	Content Statement Students will understand how to:	Indicator	Indicator
6-8	Apply the design process.	8.2.8.D.1	Design and create a product that addresses a real world problem using a design process under specific constraints.
		8.2.8.D.2	Identify the design constraints and trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation, design portfolio or engineering notebook.
		8.2.8.D.3	Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.
	Use and maintain technological products and systems.	8.2.8.D.4	Research and publish the steps for using and maintaining a product or system and incorporate diagrams or images throughout to enhance user comprehension.
		8.2.8.D.5	Explain the impact of resource selection and the production process in the development of a common or technological product or system.
	8.2.8.D.6		Identify and explain how the resources and processes used in the production of a current technological product can be modified to have a more positive impact on the environment.
9-12	Apply the design process.	8.2.12.D.1	Design and create a prototype to solve a real world problem using a design process, identify constraints addressed during the creation of the prototype, identify trade-offs made, and present the solution for peer review.
		8.2.12.D.2	Write a feasibility study of a product to include: economic, market, technical, financial, and management factors, and provide recommendations for implementation.
	Use and maintain technological products and systems.	8.2.12.D.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
		8.2.12.D.4	Assess the impacts of emerging technologies on developing countries.
	8.2.12.D.5		Explain how material processing impacts the quality of engineered and fabricated products.
	8.2.12.D.6	Synthesize data, analyze trends and draw conclusions regarding the effect of a technology on the individual, society, or the environment and publish conclusions.	

2014 New Jersey Core Curriculum Content Standards - Technology

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Strand		E. Computational Thinking: Programming: <i>Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.</i>	
Grade Level bands	Content Statement Students will be able to understand:	Indicator	Indicator
K-2	Computational thinking and computer programming as tools used in design and engineering.	8.2.2.E.1	List and demonstrate the steps to an everyday task.
		8.2.2.E.2	Demonstrate an understanding of how a computer takes input through a series of written commands and then interprets and displays information as output.
		8.2.2.E.3	Create algorithms (a sets of instructions) using a pre-defined set of commands (e.g., to move a student or a character through a maze).
		8.2.2.E.4	Debug an algorithm (i.e., correct an error).
		8.2.2.E.5	Use appropriate terms in conversation (e.g., basic vocabulary words: input, output, the operating system, debug, and algorithm).
3-5	Computational thinking and computer programming as tools used in design and engineering.	8.2.5.E.1	Identify how computer programming impacts our everyday lives.
		8.2.5.E.2	Demonstrate an understanding of how a computer takes input of data, processes and stores the data through a series of commands, and outputs information.
		8.2.5.E.3	Using a simple, visual programming language, create a program using loops, events and procedures to generate specific output.
		8.2.5.E.4	Use appropriate terms in conversation (e.g., algorithm, program, debug, loop, events, procedures, memory, storage, processing, software, coding, procedure, and data).

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Strand	E. Computational Thinking: Programming: <i>Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.</i>		
Grade Level bands	Content Statement Students will be able to understand:	Indicator	Indicator
6-8	Computational thinking and computer programming as tools used in design and engineering.	8.2.8.E.1	Identify ways computers are used that have had an impact across the range of human activity and within different careers where they are used.
9-12	Computational thinking and computer programming as tools used in design and engineering.	8.2.8.E.2	Demonstrate an understanding of the relationship between hardware and software.
		8.2.8.E.3	Develop an algorithm to solve an assigned problem using a specified set of commands and use peer review to critique the solution.
		8.2.8.E.4	Use appropriate terms in conversation (e.g., programming, language, data, RAM, ROM, Boolean logic terms).
		8.2.12.E.1	Demonstrate an understanding of the problem-solving capacity of computers in our world.
		8.2.12.E.2	Analyze the relationships between internal and external computer components.
		8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).
		8.2.12.E.4	Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).