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2014 Agricultural Power and Machinery

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The Research and Curriculum Unit (RCU), located in Starkville, MS, as part of Mississippi State University, was established to foster educational enhancements and innovations. In keeping with the land grant mission of Mississippi State University, the RCU is dedicated to improving the quality of life for Mississippians. The RCU enhances the intellectual and professional development of Mississippi students and educators while applying knowledge and educational research to the lives of the people of the state. The RCU works within the contexts of curriculum development and revision, research, assessment, professional development, and industrial training.

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Acknowledgments

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Dr. Lynn House, Interim State Superintendent of Education
Dr. O. Wayne Gann, Chair
Mr. Howell "Hal" N. Gage, Vice Chair
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Brad Skelton, Instructional Design Specialist for the Research and Curriculum Unit at Mississippi State University researched and authored this framework.
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Lee James, Program Coordinator, Office of Career and Technical Education and Workforce Development, Mississippi Department of Education, Jackson, MS
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Standards

Standards are superscripted in each unit and are referenced in the appendices. Standards in the Agriculture Power and Machinery *Curriculum Framework and Supporting Materials* are based on the following:

National Agriculture, Food, and Natural Resources (AFNR) Career Cluster Content Standards

The National AFNR Career Cluster Content Standards were developed by the National Council on Agricultural Education to serve as a guide for what students should know or be able to do through a study of agriculture in grades 9–12 and 2-year postsecondary programs. The standards were extensively researched and reviewed by leaders in the agricultural industry, secondary and postsecondary instructors, and university specialists. The standards consist of a pathway content standard for each of the eight career pathways. For each content standard, performance elements representing major topic areas with accompanying performance indicators were developed. Measurements of assessment of the performance elements and performance indicators were developed at the basic, intermediate, and advanced levels. A complete copy of the standards can be accessed at https://aged.learn.com. The National AFNR Career Cluster Content Standards are copyrighted to the National Council for Agricultural Education and are used by permission.

Common Core State Standards Initiative

The Common Core State Standards© provide a consistent, clear understanding of what students are expected to learn, so teachers and parents know what they need to do to help them. The standards are designed to be robust and relevant to the real world, reflecting the knowledge and skills that our young people need for success in college and careers. With American students fully prepared for the future, our communities will be best positioned to compete successfully in the global economy. Copyright 2010. National Governors Association Center for Best Practices and Council of Chief State School Officers. All rights reserved. States and territories of the United States as well as the District of Columbia that have adopted the Common Core State Standards in whole are exempt from this provision and no attribution to the National Governors Association Center for Best Practices and Council of Chief State School Officers is required. Reprinted from http://www.corestandards.org/.

National Educational Technology Standards for Students

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21st Century Skills and Information and Communication Technologies Literacy Standards

In defining 21st century learning, the Partnership for 21st Century Skills has embraced five content and skill areas that represent the essential knowledge for the 21st century: global awareness; civic engagement; financial, economic, and business literacy; learning skills that encompass problem-solving, critical-thinking, and self-directional skills; and Information and Communication Technology (ICT) literacy.

Preface

Secondary career and technical education programs in Mississippi face many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, ch. 487, §14; Laws, 1991, ch. 423, §1; Laws, 1992, ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Vocational Education Act IV, 2007; and No Child Left Behind Act of 2001).

Mississippi Teacher Professional Resources

The following are resources for Mississippi teachers.

Curriculum, Assessment, Professional Learning, and other program resources can be found at The Research and Curriculum Unit's website: http://www.rcu.msstate.edu

Learning Management System: An online resource

Learning Management System information can be found at the RCU's website, under Professional Learning.

Should you need additional instructions, please call 662.325.2510.

My PLC: An online registration for all professional-development sessions

To register for any session, teachers will need an account in the registration system, MyPLC, https://myplc.rcu.msstate.edu. To create an account, click on the link and navigate to the "Request a Guest ID" link. The ID should be the teacher's first initial and last name and the last four (4) digits of the social security number. Teachers should complete the entire form, which will then be sent to a secure server. Upon activation of the teacher's account, he or she will receive an e-mail with login instructions. The teacher may then browse for the available sessions and register for the desired courses.

Should you need additional instructions, please call 662.325.2510.

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Executive Summary

Pathway Description

The Agriculture Power and Machinery pathway is a curriculum that provides an educational option for students who have successfully completed the Agriculture Power and Machinery Core (2 Carnegie credits).

Agriculture Power and Machinery is a pathway designed to provide basic skills for students to become employed in the industry of agricultural power mechanics or to continue their education in postsecondary institutions. Skills taught in this pathway relate to the selection, operation, service, maintenance, and repair of a variety of agricultural power units and agricultural machinery and equipment. This pathway also includes instruction in gasoline and diesel engines, welding, hydraulics, and other power systems. Students in the pathway will participate in active learning exercises including integral activities of the FFA organization and supervised experiences. Students who successfully complete the competencies in this pathway will possess fundamental knowledge and skills that can be used to secure entry-level employment or as a foundation for continuing their education. Industry standards are adapted from the publication *Career Cluster Resources for Agriculture, Food, and Natural Resources*, developed by the National Association of State Directors of Career and Technical Education.

Industry Certification

No national industry-recognized certifications exist at this time. Competencies and suggested performance indicators in the APM course have been correlated, however, to the National Agriculture, Food, and Natural Resources (AFNR) Career Cluster Content Standards that have been reviewed and endorsed at the national level by the National Council on Agricultural Education.

Assessment

The latest assessment blueprint for the curriculum can be found at

http://www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

If there are questions regarding assessment of this program, please contact the Research and Curriculum Unit at 662.325.2510.

Student Prerequisites

In order for students to be able to experience success in the APM program, the following student prerequisites are in suggested:

1. C or higher in English (the previous year)
2. C or higher in Math (last course taken or the instructor can specify the math)
3. Instructor Approval and TABE Reading Score (eighth grade or higher)

or

1. TABE Reading Score (eighth grade or higher)
2. Instructor Approval

or

1. Instructor Approval

Teacher Licensure

The latest teacher licensure information can be found at

http://www.mde.k12.ms.us/educator-licensure.

Professional Learning

If you have specific questions about the content of each training session provided, please contact the Research and Curriculum Unit at 662.325.2510, and ask for the Professional Learning Specialist.

Course Outlines

Option 1—Two One-Carnegie-Unit Courses

This curriculum consists of two one-credit courses, which should be completed in the following sequence:

1. **Agricultural Power and Machinery: Diesel and Hydraulic Systems, and Advanced Cutting—Course Code: 991304**

2. **Agricultural Power and Machinery: Advanced Equipment Systems, Maintenance, and Repair—Course Code: 991305**

Course Description: Agricultural Power and Machinery: Diesel and Hydraulic Systems and Advanced Cutting

This course emphasizes specialized systems such as Diesel engines and hydraulics. Additionally, students will spend more time with cutting and welding covering more advanced techniques.

Course Description: **Agricultural Power and Machinery: Advanced Equipment Systems, Maintenance and Repair**

This course will offer students the opportunity to examine electrical and electronic systems found on modern agricultural equipment. Additionally, students will learn about equipment operation. Students will also discuss advanced technology that has been introduced as well as new and emerging technologies.

Agricultural Power and Machinery: Diesel and Hydraulic Systems and Advanced Cutting—Course Code: 991304

Unit	Unit Name	Hours
1	Orientation and Safety Review	10
2	Advanced Cutting and Welding	50
3	Hydraulic Systems	25
4	Diesel Engines	35
Total		120

Agricultural Power and Machinery: Advanced Equipment Systems, Maintenance and Repair—Course Code: 991305

Unit	Unit Name	Hours
5	Electrical/Electronic Systems	25
6	Agricultural Equipment Maintenance and Operation	50
7	Advanced Technology in Agriculture	15
Total		90

Option 2—One Two-Carnegie-Unit Course

This curriculum consists of one two-credit course as follows:

Agriculture Power and Machinery—Course Code: 991301

Course Description: Agriculture Power and Machinery

This course emphasizes specialized systems such as Diesel engines and hydraulics and more time with cutting and welding covering advanced techniques. This course will also offer students the opportunity to examine electrical and electronic systems found on modern agricultural equipment. Students will learn about equipment operation, advanced technology in agriculture power, and new and emerging technologies.

Agriculture Power and Machinery—Course Code: 991301

Unit	Unit Name	Hours
1	Orientation and Safety Review	10
2	Advanced Cutting and Welding	50
3	Hydraulic Systems	25
4	Diesel Engines	35
5	Electrical/Electronic Systems	25
6	Agricultural Equipment Maintenance and Operation	50
7	Advanced Technology in Agriculture	15
Total		210

Research Synopsis

Needs of the Future Workforce

Data for this synopsis were compiled from the Mississippi Department of Employment Security (2013). Employment opportunities for all but one of the occupations listed below are projected to grow or to remain steady (MDES, 2013).

Current and Projected Occupation Report

Description	Jobs, 2008	Projected Jobs, 2018	Change (Number)	Change (Percent)	Average Hourly Earning
Purchasing Agents and Buyers, Farm Products	50	50	0	0.0	$31.39
Agricultural Inspectors	250	270	20	8.0	$19.65
Graders and Sorters, Agricultural Products	400	370	-30	-7.5	$9.61
Farm Equipment Mechanics	470	520	50	10.6	$16.08
Agricultural Equipment Operators	750	770	20	2.7	$8.90

Source: Mississippi Department of Employment Security; www.mdes.ms.gov (accessed March 18, 2013).

Perkins IV Requirements

The APM curriculum meets Perkins IV requirements of high-skill, high-wage, and/or high-demand occupations by introducing students to and preparing students for occupations. It also offers students a program of study including secondary, postsecondary, and IHL courses that will prepare them for occupations in these fields. Additionally, the APM curriculum is integrated with academic common core standards. Lastly, the APM curriculum focuses on ongoing and meaningful professional development for teachers as well as relationships with industry.

Curriculum Content

Summary of Standards**.**

The standards to be included in the APM curriculum are the Common Core Standards for Mathematics and Science, 21st Century Skills, and the National Educational Technology Standards (NETS) for Students. Combining these standards to create this document will result in highly skilled, well-rounded students who are prepared to enter a secondary academic or career

and technical program of study. They will also be prepared to academically compete nationally as the Common Core Standards are designed to prepare students for success in community colleges, institutions of higher learning, and careers.

Academic Credit

If academic credit is awarded, please review the Research and Curriculum Unit link at https://www.rcu.msstate.edu/MDE/PathwaystoSuccess.aspx.

Click "*Curriculum Enhancement List"*. Check this site often as it is updated frequently.

Academic Infusion

The APM curriculum is tied to the Common Core Reading and Writing standards. The curriculum provides multiple opportunities to enhance and reinforce these academic skills. Since students will be required to communicate effectively in the classroom as well as in the workforce, there is a considerable amount of reading and writing in this curriculum. Overall, the AMP content requires students to make presentations, read technical manuals, and use strategic and critical thinking skills to solve real-world problems.

Transition to Postsecondary Education

The latest articulation information for Secondary to Postsecondary can be found at the Mississippi Community College Board (MCCB) website http://www.mccb.edu/

Best Practices

Experiential Learning (SAE)

The Experiential Learning (SAE) has long been and continues to be the backbone of every agriculture program. The experiential learning projects can be used in a variety of situations to reinforce and compliment classroom theory and content. The experiential learning project consists of entrepreneurship, placement, research/experimentation and exploratory.

Innovative Instructional Technologies Recognizing that today's students are digital learners, the classroom should be equipped with tools that will teach them in the way they need to learn. The APM teacher's goal should be to include teaching strategies that incorporate current technology. It is suggested that each classroom house a classroom set of desktop student computers and one teacher laptop. To make use of the latest online communication tools such as wikis, blogs, and podcasts, the classroom teacher is encouraged to use a learning management system, for example, the Agriculture Teacher Learning Management System, that introduces students to education in an online environment and places the responsibility of learning on the student.

Differentiated Instruction

Students learn in a variety of ways. Some are visual learners, needing only to read information and study it to succeed. Others are auditory learners, thriving best when information is read aloud to them. Still others are tactile learners, needing to participate actively in their learning experiences. Add the student's background, emotional health, and circumstances, and a very unique learner emerges. Many activities are graded by rubrics that allow students to choose the type of product they will produce. By providing various teaching and assessment strategies, students with various learning styles can succeed.

Career and Technical Education Student Organizations

Teachers should investigate opportunities to sponsor a student organization. There are several here in Mississippi that will foster the types of learning expected from the APM curriculum. The FFA is the student's organization for APM. The FFA provides students with growth opportunities and competitive events. It also opens the doors to the world of agriculture and scholarships opportunities.

Cooperative Learning

Cooperative learning can help students understand topics when independent learning cannot. Therefore, you will see several opportunities in the APM curriculum for group work. To function in today's workforce, students need to be able to work collaboratively with others and solve problems without excessive conflict. The APM curriculum provides opportunities for students to work together and help each other to complete complex tasks.

Conclusions

The APM curriculum is one of Mississippi's comprehensive agriculture curriculums. Students that complete this program are well equipped for a variety of endeavors. Instructors are urged to encourage APM students to pursue educational opportunities at community colleges and universities in Mississippi.

Professional Organizations

American Association for Agricultural Education. May be found at http://aaaeonline.org/

P.A.C.E. - Mississippi Agriculture Education. May be found at http://rcu.blackboard.com

Mississippi ACTE. May be found at http://www.mississippiacte.com/

Mississippi FFA/ Mississippi Association of Vocational Agriculture Teachers (MAVAT). May be found at www.mississippiffa.org

National FFA Organization
P.O. Box 68960, 6060 FFA Drive
Indianapolis, IN 46268
317-802-6060
http://www.ffa.org

National Association of Agricultural Educators
300 Garrigus Building- University of Kentucky
Lexington, KY 40546
800 - 509 - 0204
http://www.naae.org/

Using this Document

Suggested Time on Task
An estimated number of clock hours of instruction that should be required to teach the competencies and objectives of the unit. A minimum of 140 hours of instruction is required for each Carnegie unit credit. The curriculum framework should account for approximately 75–80% of the time in the course.

Competencies and Suggested Objectives
A competency represents a general concept or performance that students are expected to master as a requirement for satisfactorily completing a unit. Students will be expected to receive instruction on all competencies. The suggested objectives represent the enabling and supporting knowledge and performances that will indicate mastery of the competency at the course level.

Integrated Academic Topics, 21st Century Skills and Information and Communication Technology Literacy Standards, ACT College Readiness Standards, and Technology Standards for Students
This section identifies related academic topics as required in the Subject Area Testing Program (SATP) in Algebra I, Biology I, English II, and U.S. History from 1877, which are integrated into the content of the unit. Research-based teaching strategies also incorporate ACT College Readiness standards. This section also identifies the 21st Century Skills and Information and Communication Technology Literacy skills. In addition, national technology standards for students associated with the competencies and suggested objectives for the unit are also identified.

References
A list of suggested references is provided for each unit. The list includes some of the primary instructional resources that may be used to teach the competencies and suggested objectives. Again, these resources are suggested, and the list may be modified or enhanced based on needs and abilities of students and on available resources.

Agriculture Power and Machinery
Unit 1: Orientation and Safety Review

Competencies and Suggested Objectives
1. Review the local school rules and regulations. DOK1, AT a. Describe local school rules found in the student handbook. b. Describe attendance policies. c. Describe laboratory and facilities associated with the program.
2. Review the general laboratory safety requirements for Agriculture Power and Machinery. DOK1, AT a. Review personal safety rules for working in the laboratory and/or Agriculture Power and Machinery industry, including the eye safety law. b. Review general workplace safety rules per OSHA and/or other safety organizations standards. c. Review accident reporting procedures. d. Review procedures for applying fire safety in the agricultural mechanics shop. e. Review location of firefighting equipment. f. Review classes of fires and associated equipment for each class. g. Review exit locations in case of emergency.
3. Review FFA activities pertaining to Agriculture Power and Machinery. DOK1 a. Review the purposes of the FFA organization. b. Participate in the leadership and personal development activities and competitive events of FFA.
4. Update and maintain SAE plan of activities for the coming year. DOK2, AB a. Maintain income and expense records. b. Prepare inventory records. c. Compute a net worth statement. d. Maintain records of supplementary and improvement activities and leadership development activities.

Scenario

How Safe is Your Shop?

Unit 1

Using the information you learned about shop safety, color coding, and any other terms you learned for this unit evaluate your shop's safety practices. Pretend you are an OSHA safety inspector. Begin by measuring the shop and creating a drawing of the shop. Accurately mark all equipment locations, hazard zones using the OSHA color coding system and any other pertinent safety information. After you have completed your drawing, develop a list of potential hazards or violations discovered. In your list, include ways to correct the issues found.

Attachments for Performance Task

Rubrics can be found in the teacher resources document found on the RCU Curriculum Download page: www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

MSDS Interpretation
Unit 1

Provide students with various MSDS sheets. Have the students read the sheet and present the information found to the class. Reported information should include hazards, any poison control measures to use, chemical type, and any other terms you learned for this unit.

Attachments for Performance Task

None

Unit 2: Advanced Cutting and Welding

Competencies and Suggested Objectives
1. Prepare parts from simple sketches or drawings. DOK2, AT a. Interpret basic elements of a drawing or sketch. b. Interpret welding symbol information such as 1-G, 2-G, 3-G, and 4-G.
2. Layout and fit up joints from welding symbol information. DOK2, AT a. Demonstrate lay out principles. b. Fit up joints from welding symbol information.
3. Perform welding operations to prepare a welded fabrication from simple sketches or drawings. DOK2, AT
4. Make minor external repairs to equipment and accessories. DOK2, AT
5. Perform advanced arc welding. DOK2, AT a. Perform vertical and horizontal butt welds in mild steel. b. Perform fillet and lap welds in vertical and horizontal positions.
6. Perform Metal Inert Gas (MIG) welding. DOK2, AT a. Demonstrate safety procedures for MIG welding. b. Identify and describe the use of different supplies and accessories associated with MIG welding. c. Discuss welding equipment setup associated with metal thicknesses and types. d. Set up MIG welding equipment. e. Weld mild steel with MIG welding equipment in the flat, vertical, horizontal, and overhead positions.
7. Perform Tungsten Arc (TIG) welding. DOK2, AT a. Demonstrate safety procedures for TIG welding. b. Identify accessories and supplies used in TIG welding and describe their use. c. Discuss welding equipment setup associated with metal thicknesses and types d. Set up TIG welding equipment. e. Weld with TIG welding equipment.
8. Perform Plasma Arc Cutting (PAC). DOK2, AT a. Demonstrate safety procedures for PAC. b. Discuss the plasma arc cutting process. c. Discuss the components of a plasma arc cutter. d. Set up PAC equipment. e. Cut mild steel with PAC equipment.

Scenario

Make the Right Choice

Unit 2

Have students identify type and thickness of metal in order to select appropriate equipment to perform welding task. After proper equipment has been selected, the student will set equipment to proper manufacturers specifications. Student will then perform the weld required as prescribed by the instructor.

Attachments for Performance Task

Rubrics can be found in the teacher resources document found on the RCU Curriculum Download page: www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Unit 3: Hydraulic Systems

Competencies and Suggested Objectives
1. Explain the physical laws of hydraulics. (DOK1, AT) a. Define kinetic energy. b. Define potential energy.
2. Identify types of hydraulic pumps. (DOK1, AT) a. Identify a constant displacement pump. b. Identify a variable displacement pump.
3. Identify and describe the functions of hydraulic control valves. (DOK1, AT) a. Identify the types of hydraulic valves. b. Describe the functions of hydraulic valves.
4. Identify and describe the functions of hydraulic actuators. (DOK1, AT) a. Identify types of hydraulic actuators. b. Describe the functions of hydraulic actuators.
5. Explain the functions of hydraulic systems. (DOK2, AT) a. Describe the function of an open center hydraulic system. b. Describe the function of a closed center hydraulic system. c. Read and interpret hydraulic schematics.
6. Demonstrate maintenance of hydraulic systems per manufacturer's specifications. DOK2, AT a. Check fluid levels and condition. b. Service filter system. c. Change hydraulic fluids. d. Inspect system for external leaks and correct where necessary.
7. Demonstrate the operation of a hydraulic system. DOK2, AT

Scenario

Teach Me Something

Unit 3

Divide students into groups. Assign each group a topic, such as valves, cylinders, pumps, filters, or reservoirs. Have each group become an expert on that component of the hydraulic system. Have each group present their assigned topic to the other members of the class.

Attachments for Performance Task

Rubrics can be found in the teacher resources document found on the RCU Curriculum Download page: www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Unit 4: Diesel Engines

Competencies and Suggested Objectives
1. Describe basic operating principles of diesel engines. DOK1, AT a. Identify the differences in a diesel engine and a gasoline engine. b. Describe the sequence of events in each stroke of a four cycle diesel engine.
2. Identify the components of the diesel engine. DOK1, AT a. Identify the components of the basic engine block assembly including the cylinder head, pistons, connecting rods, crankshaft and bearings, camshaft and bearings, cylinder liners, and engine block. b. Describe the functions of the components of the diesel engine including the cylinder head, pistons, connecting rods, crankshaft and bearings, camshaft and bearings, cylinder liners, and engine block.
3. Identify the components of the lubrication system. DOK1, AT a. Identify the oil pump, oil cooler, filter, and relief valve. b. Describe the functions of the oil pump, oil cooler, filter, and relief valve.
4. Identify the components of cooling system. DOK1, AT a. Identify the components of the cooling system including radiator, thermostat, water pump, radiator cap, radiator hoses, belts and pulleys, coolant and shroud. b. Describe the functions of the components of the cooling system including radiator, thermostat, water pump, radiator cap, radiator hoses, belts and pulleys, coolant and shroud.
5. Identify the components of fuel system. DOK1, AT a. Identify the components of the fuel system including reservoir, transfer pump, injector pump, injectors, filter, valves, lines and hoses, and fuel. b. Describe the functions of the components of the fuel system including reservoir, transfer pump, injector pump, injectors, filter, valves, lines and hoses, and fuel.

Scenario

Tell Me About It

Unit 4

Have students use technology productivity tools, classroom resources, and the internet to define and illustrate terms related to diesel engines. Students will then be asked to teach the class a certain number of the terms as decided by the instructor.

Attachments for Performance Task

Rubrics can be found in the teacher resources document found on the RCU Curriculum Download page: www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

What's the Difference?
Unit 4

Have students create a PowerPoint presentation or video presentation to discuss differences in a diesel and a gasoline engine including ignition by compression, higher compression ratios, and fuel delivery.

Attachments for Performance Task

Rubrics can be found in the teacher resources document found on the RCU Curriculum Download page: www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Feel the Flow
Unit 4

Have student create a poster to illustrate the sequence of events in a four-stroke diesel engine. The students will use technology tools and the writing process to create a flowchart that illustrates the sequence of events in a four-stroke diesel engine. The students will be responsible for presenting their information to the class.

Attachments for Performance Task

Rubrics can be found in the teacher resources document found on the RCU Curriculum Download page: www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Unit 5: Electrical/Electronics Systems

Competencies and Suggested Objectives
1. Explain the functions of the components of the cranking and charging systems. DOK1, AT a. Describe the function of the cranking system including starter, solenoid, and relay. b. Describe the functions of the charging system including alternator, regulator, and indicator gauges. (DOK1)
2. Demonstrate troubleshooting procedures for the electrical system. DOK2, AT a. Demonstrate ability to use digital multimeter. b. Use service specifications. c. Read and interpret electrical symbols and schematics. d. Make necessary wire and terminal repairs.
3. Investigate electronics systems used on tractors, implements, and stationary systems. DOK2, AT a. Discuss the use of electronic sensors on tractors and implements. b. Identify components of electronic systems such as safety switches, and so forth. c. Interpret electronic schematics and blueprints.

Scenario

Getting Charged Up

Unit 5

Have each student or group of students create a video or PowerPoint presentation and lead a discussion on charging systems that covers safety procedures, components and their functions, and testing and servicing the system.

Attachments for Performance Task

Rubrics can be found in the teacher resources document found on the RCU Curriculum Download page: www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Show Your Skills

Unit 5

Have each student or group of students use a multimeter to test various circuits for resistance, voltage, and continuity. Students will interpret the readings to determine if the circuits tested are operating properly.

Attachments for Performance Task

Rubrics can be found in the teacher resources document found on the RCU Curriculum Download page: www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Unit 6: Agricultural Equipment Maintenance and Operation

Competencies and Suggested Objectives
1. Review manufacturer's manuals for periodic maintenance of agricultural equipment. DOK1, AT a. Read and interpret manufacturer's manuals to obtain specifications for periodic maintenance. b. Perform periodic maintenance according to manufacturer's specifications.
2. Review manufacturer's manuals for seasonal maintenance of agricultural equipment. DOK1, AT a. Read and interpret manufacturer's manuals to obtain specifications for seasonal maintenance. b. Perform seasonal maintenance according to manufacturer's specifications.
3. Review the operator's manuals to determine procedures for safe operation of agricultural equipment. DOK1, AT a. Identify equipment controls and describe their function. b. Identify instruments and indicators and describe their function. c. Identify safety equipment including safety switches, rollover protection, and seat belts.
4. Operate tractor and equipment safely. DOK1, AT a. Conduct inspection prior to operation. b. Operate the tractor safely including starting, warm-up, clutch engagement, and brake controls. c. Attach, set up, and adjust an implement on a tractor. d. Demonstrate operation under field conditions.
5. Describe principles of troubleshooting agricultural equipment. DOK2, AT a. Explain the meaning and importance of troubleshooting. b. Describe the processes and tools used in agricultural equipment troubleshooting. c. Apply troubleshooting procedures in solving a problem.

Scenario

How We Roll

Unit 6

You are the delivery and setup person for a local tractor dealership. Demonstrate the proper use of all components and functions of the tractor to another student (new owner) using the provided checklist.

Attachments for Performance Task

Rubrics can be found in the teacher resources document found on the RCU Curriculum Download page: www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Unit 7: Advanced Technology in Agriculture

Competencies and Suggested Objectives
1. Research advanced technology being utilized in agriculture. DOK1, AT a. Establish areas of new technology applications. b. Determine locations where demonstrations may be observed. c. Conduct investigations to observe and record applications of advanced technology.
2. Discuss the concepts and operating principles of precision agriculture technology. DOK1, AT a. Identify and describe the components of a precision agriculture technology system. b. Describe the use of global positioning receivers in precision agriculture. c. Describe the use of spatial imagery in precision agriculture. d. Describe the use of geographic information system software in precision agriculture. e. Describe the use of variable rate application in precision agriculture. f. Describe the use of yield monitoring in precision agriculture.

Scenario

What's New?

Unit 7

Have students research new and emerging technologies in agricultural power and machinery (biodiesel, ethanol, and nanotechnology). Have students use technology tools, the writing process, and APA or MLA formatting guidelines to develop a report. Have students use their reports to prepare an illustrated PowerPoint presentation to be presented to the class.

Attachments for Performance Task

Rubrics can be found in the teacher resources document found on the RCU Curriculum Download page: www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

What's the Point?

Unit 7

Invite a crop consultant to speak to the class on the concepts and practices of precision agriculture techniques. Have students utilize the KWL chart to start a discussion about what they already know about the topic using the K section of the chart. While the speaker gives the presentation, instruct students to use the W section of the chart. Finally, after the speaker leaves, discuss the L section of the chart about what they learned.

Attachments for Performance Task

Rubrics can be found in the teacher resources document found on the RCU Curriculum Download page: www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Tell Me All About It

Unit 7

Have students research a topic related to global positioning receivers, special imagery, or geographic information systems. Have students use technology tools, the writing process, and APA or MLA formatting guidelines to develop a summary report. Have students use their report to prepare an illustrated PowerPoint presentation to be made to the class.

Attachments for Performance Task

Rubrics can be found in the teacher resources document found on the RCU Curriculum Download page: www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx

Student Competency Profile

Student's Name: _____

This record is intended to serve as a method of noting student achievement of the competencies in each unit. It can be duplicated for each student, and it can serve as a cumulative record of competencies achieved in the course.

In the blank before each competency, place the date on which the student mastered the competency.

Unit 1: Orientation and Safety Review		
	1.	Review the local school rules and regulations.
	2.	Review the general laboratory safety requirements for Agriculture Power and Machinery.
	3.	Review FFA activities pertaining to Agriculture Power and Machinery.
	4.	Update and maintain SAE plan of activities for the coming year.

Unit 2: Advanced Cutting and Welding		
	1.	Prepare parts from simple sketches or drawings.
	2.	Layout and fit up joints from welding symbol information.
	3.	Perform welding operations to prepare a welded fabrication from simple sketches or drawings.
	4.	Make minor external repairs to equipment and accessories.
	5.	Perform advanced arc welding.
	6.	Perform Metal Inert Gas (MIG) welding.
	7.	Perform Tungsten Arc (TIG) welding
	8.	Perform Plasma Arc Cutting (PAC).
Unit 3: Hydraulic Systems		
	1.	Explain the physical laws of hydraulics.
	2.	Identify types of hydraulic pumps.
	3.	Identify and describe the functions of hydraulic control valves.
	4.	Identify and describe the functions of hydraulic actuators.
	5.	Explain the functions of hydraulic systems.
	6.	Demonstrate maintenance of hydraulic systems per manufacturer's specifications.
	7.	Demonstrate the operation of a hydraulic system.
Unit 4: Diesel Engines		
	1.	Describe basic operating principles of diesel engines.

	2.	Identify the components of the diesel engine.
	3.	Identify the components of the lubrication system.
	4.	Identify the components of cooling system.
	5.	Identify the components of fuel system.
Unit 5: Electrical/Electronic Systems		
	1.	Explain the functions of the components of the cranking and charging systems.
	2.	Demonstrate troubleshooting procedures for the electrical system.
	3.	Investigate electronics systems used on tractors, implements, and stationary systems.
Unit 6: Agricultural Equipment Maintenance and Operation		
	1.	Review manufacturer’s manuals for periodic maintenance of agricultural equipment.
	2.	Review manufacturer’s manuals for seasonal maintenance of agricultural equipment.
	3.	Review the operator's manuals to determine procedures for safe operation of agricultural equipment.
	4.	Operate tractor and equipment safely.
	5.	Describe principles of troubleshooting agricultural equipment.
Unit 7: Advanced Technology in Agriculture		
	1.	Research advanced technology being utilized in agriculture.
	2.	Discuss the concepts and operating principles of precision agriculture technology.

Appendix A: Unit References

All of the resources list below are common to each unit in the Agriculture Power and Machinery curriculum.. You will find suggested resources for each unit following the common list.

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Appendix B: Industry Standards

AGRICULTURE, FOOD, AND NATURAL RESOURCES (AFNR) PATHWAY CONTENT STANDARDS AND PERFORMANCE ELEMENTS

	Units	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
APM I							
AB -AGRIBUSINESS SYSTEMS		X					
AS -ANIMAL SYSTEMS							
AO - BIOTECHNOLOGY							
AE - ENVIRONMENTAL SERVICE SYSTEMS							
AF -FOOD PRODUCTS AND PROCESSING SYSTEMS							
AN -NATURAL RESOURCE SYSTEMS							
AP -PLANT SYSTEMS							
AT -POWER, STRUCTURAL, AND TECHNICAL SYSTEMS		X	X	X	X	X	X

AT - POWER, STRUCTURAL, AND TECHNICAL SYSTEMS
AP - PLANT SYSTEMS
AN - NATURAL RESOURCE SYSTEMS
AF - FOOD PRODUCTS AND PROCESSING SYSTEMS
AE - ENVIRONMENTAL SERVICE SYSTEMS
AO - BIOTECHNOLOGY
AS - ANIMAL SYSTEMS
AB - AGRIBUSINESS SYSTEMS

The AFNR Pathway Content Standards and Performance Elements are adapted from *National Agriculture, Food, and Natural Resources (AFNR) Career Cluster Content Standards.* Reprinted with permission from the National Council for Agricultural Education, 1410 King Street, Suite 400, Alexandria, VA 22314, 800.772.0939. Copyright © 2009. A complete copy of the National Standards can be downloaded from the Team Ag Ed Learning Center at https://aged.learn.com.

AB - AGRIBUSINESS SYSTEMS

Pathway Content Standard: The student will demonstrate competence in the application of principles and techniques for the development and management of agribusiness systems.

ABS.01. Utilize economic principles to establish and manage an AFNR enterprise.

ABS.01.01. Apply principles of capitalism in the business environment.

ABS.01.02. Apply principles of entrepreneurship in businesses.

ABS.02. Utilize appropriate management planning principles in AFNR business enterprises.

ABS.02.01. Compose and analyze a business plan for an enterprise.

ABS.02.02. Read, interpret, evaluate, and write a mission statement to guide business goals, objectives, and resource allocation.

ABS.02.03. Apply appropriate management skills to organize a business.

ABS.02.04. Recruit, train, and retain appropriate and productive human resources for business.

ABS.03. Utilize record keeping to accomplish AFNR business objectives while complying with laws and regulations.

ABS.03.01. Prepare and maintain all files needed to accomplish effective record keeping.

ABS.03.02 Implement appropriate inventory management practices.

ABS.04. Apply generally accepted accounting principles and skills to manage cash budgets, credit budgets, and credit for AFNR businesses.

ABS.04.01. Use accounting fundamentals to accomplish dependable bookkeeping and fiscal management.

ABS.05. Assess accomplishment of goals and objectives by an AFNR business.

ABS.05.01. Maintain and interpret financial information (income statements, balance sheets, inventory, purchase orders, accounts receivable, and cash-flow analyses) for businesses.

ABS.06. Use industry-accepted marketing practices to accomplish AFNR business objectives.

ABS.06.01. Conduct appropriate market and marketing research.

ABS.06.02. Develop a marketing plan.

ABS.06.03. Develop strategies for marketing plan implementation.

ABS.06.04. Develop specific tactics to market AFNR products and services.

ABS.07. Create a production system plan.

ABS.07.01. Prepare a step-by-step production plan that identifies needed resources.

ABS.07.02. Develop a production and operational plan.

ABS.07.03. Utilize appropriate techniques to determine the most likely strengths, weaknesses, and inconsistencies in a business plan, and relate these to risk management strategies.

ABS.07.04. Manage risk and uncertainty.

AS - ANIMAL SYSTEMS

Pathway Content Standard: The student will demonstrate competence in the application of scientific principles and practices to the production and management of animals.

AS.01. Examine the components, historical development, global implications, and future trends of the animal systems industry.

AS.01.01. Evaluate the development and implications of animal origin, domestication, and distribution.

AS.02. Classify, evaluate, select, and manage animals based on anatomical and physiological characteristics.

AS.02.01. Classify animals according to hierarchical taxonomy and agricultural use.

AS.02.02. Apply principles of comparative anatomy and physiology to uses within various animal systems.

AS.02.03. Select animals for specific purposes and maximum performance based on anatomy and physiology.

AS.03. Provide for the proper health care of animals.

AS.03.01. Prescribe and implement a prevention and treatment program for animal diseases, parasites, and other disorders.

AS.03.02. Provide for the biosecurity of agricultural animals and production facilities.

AS.04. Apply principles of animal nutrition to ensure the proper growth, development, reproduction, and economic production of animals.

AS.04.01. Formulate feed rations to provide for the nutritional needs of animals.

AS.04.02. Prescribe and administer animal feed additives and growth promotants in animal production.

AS.05. Evaluate and select animals based on scientific principles of animal production.

AS.05.01. Evaluate the male and female reproductive systems in selecting animals.

AS.05.02. Evaluate animals for breeding readiness and soundness.

AS.05.03. Apply scientific principles in the selection and breeding of animals.

AS.06. Prepare and implement animal handling procedures for the safety of animals and producers and consumers of animal products.

AS.06.01. Demonstrate safe animal handling and management techniques.

AS.06.02. Implement procedures to ensure that animal products are safe.

AS.07. Select animal facilities and equipment that provide for the safe and efficient production, housing, and handling of animals.

AS.07.01. Design animal housing, equipment, and handling facilities for the major systems of animal production.

AS.07.02. Comply with government regulations and safety standards for facilities used in animal production.

AS.08. Analyze environmental factors associated with animal production.

AS.08.01. Reduce the effects of animal production on the environment.

AS.08.02. Evaluate the effects of environmental conditions on animals.

AO - BIOTECHNOLOGY

Pathway Content Standard: The student will demonstrate competence in the application of scientific principles and techniques to biotechnology in agriculture.

BS.01. Recognize the historical, social, cultural, and potential applications of biotechnology.

BS.01.01. Distinguish major innovators, historical developments, and potential applications of biotechnology in agriculture.

BS.01.02. Determine regulatory issues, and identify agencies associated with biotechnology.
BS.01.03. Analyze the ethical, legal, social, and cultural issues relating to biotechnology.

BS.02 Demonstrate laboratory skills as applied to biotechnology.

BS.02.01. Maintain and interpret biotechnology laboratory records.
BS.02.02. Operate biotechnology laboratory equipment according to standard procedures.
BS.02.03. Demonstrate proper laboratory procedures using biological materials.
BS.02.04. Safely manage biological materials, chemicals, and wastes used in the laboratory.
BS.02.05. Perform microbiology, molecular biology, enzymology, and immunology procedures.

BS.03. Demonstrate the application of biotechnology to Agriculture, Food, and Natural Resources (AFNR).

BS.03.01. Evaluate the application of genetic engineering to improve products of AFNR systems.
BS.03.02. Perform biotechnology processes used in AFNR systems.
BS.03.03. Use biotechnology to monitor and evaluate procedures performed in AFNR systems.

AE - ENVIRONMENTAL SERVICE SYSTEMS

Pathway Content Standard: The student will demonstrate competence in the application of scientific principles and techniques to the management of environmental service systems.

ESS.01. Use analytical procedures to plan and evaluate environmental service systems.

ESS.01.01. Analyze and interpret samples.

ESS.02. Assess the impact of policies and regulations on environmental service systems.

ESS.02.01. Interpret laws affecting environmental service systems.

ESS.03. Apply scientific principles to environmental service systems.

ESS.03.01. Apply meteorology principles to environmental service systems.
ESS.03.02. Apply soil science principles to environmental service systems.
ESS.03.03. Apply hydrology principles to environmental service systems.
ESS.03.04. Apply best management techniques associated with the properties, classifications, and functions of wetlands.
ESS.03.05. Apply chemistry principles to environmental service systems.
ESS.03.06. Apply microbiology principles to environmental service systems.

ESS.04. Operate environmental service systems to manage a facility environment.

ESS.04.01. Use pollution control measures to maintain a safe facility environment.
ESS.04.02. Manage safe disposal of all categories of solid waste.
ESS.04.03. Apply the principles of public drinking water treatment operations to ensure safe water at a facility.
ESS.04.04. Apply principles of wastewater treatment to manage wastewater disposal in keeping with rules and regulations.

ESS.04.05. Manage hazardous materials to assure a safe facility and to comply with applicable regulations.

ESS.05. Examine the relationships between energy sources and environmental service systems.

ESS.05.01. Compare and contrast the impact of conventional and alternative energy sources on the environment.

ESS.06. Use tools, equipment, machinery, and technology to accomplish tasks in environmental service systems.

ESS.06.01. Use technological and mathematical tools to map land, facilities, and infrastructure.

ESS.06.02. Maintain tools, equipment, and machinery in safe working order for tasks in environmental service systems.

AF - FOOD PRODUCTS AND PROCESSING SYSTEMS

Pathway Content Standard: The student will demonstrate competence in the application of scientific principles, practices, and techniques in the processing, storage, and development of food products.

FPP.01. Examine components of the food industry and historical development of food products and processing.

FPP.01.01. Evaluate the significance and implications of changes and trends in the food products and processing industry.

FPP.01.02. Work effectively with industry organizations, groups, and regulatory agencies affecting the food products and processing industry.

FPP.02. Apply safety principles, recommended equipment, and facility management techniques to the food products and processing industry.

FPP.02.01. Manage operational procedures, and create equipment and facility maintenance plans.

FPP.02.02. Implement Hazard Analysis and Critical Control Point (HACCP) procedures to establish operating parameters.

FPP.02.03. Apply safety and sanitation procedures in the handling, processing, and storing of food products.

FPP.02.04. Demonstrate worker safety procedures with food product and processing equipment and facilities.

FPP.03. Apply principles of science to the food products and processing industry.

FPP.03.01. Apply principles of science to food processing to provide a safe, wholesome, and nutritious food supply.

FPP.04. Select and process food products for storage, distribution, and consumption.

FPP.04.01. Utilize harvesting, selection, and inspection techniques to obtain quality food products for processing.

FPP.04.02. Evaluate, grade, and classify processed food products.

FPP.04.03. Process, preserve, package, and present food and food products for sale and distribution.

AN - NATURAL RESOURCE SYSTEMS

Pathway Content Standard: The student will demonstrate competence in the application of scientific principles and techniques to the management of natural resources.

NRS.01. Explain interrelationships between natural resources and humans necessary to conduct management activities in natural environments.

- NRS.01.01. Apply knowledge of natural resource components to the management of natural resource systems.
- NRS01.02. Classify natural resources.

NRS.02. Apply scientific principles to natural resource management activities.

- NRS.02.01. Develop a safety plan for work with natural resources.
- NRS.02.02. Demonstrate cartographic skills to aid in developing, implementing, and evaluating natural resource management plans.
- NRS.02.03. Measure and survey natural resource status to obtain planning data.
- NRS.02.04. Demonstrate natural resource enhancement techniques.
- NRS.02.05. Interpret laws related to natural resource management and protection.
- NRS.02.06. Apply ecological concepts and principles to natural resource systems.

NRS.03. Apply knowledge of natural resources to production and processing industries.

- NRS.03.01. Produce, harvest, process, and use natural resource products.

NRS.04. Demonstrate techniques used to protect natural resources.

- NRS.04.01. Manage fires in natural resource systems.
- NRS.04.02. Diagnose plant and wildlife diseases, and follow protocol to prevent their spread.
- NRS.04.03. Manage insect infestations of natural resources.

NRS.05. Use effective methods and venues to communicate natural resource processes to the public.

- NRS.05.01. Communicate natural resource information to the public.

AP - PLANT SYSTEMS

Pathway Content Standard: The student will demonstrate competence in the application of scientific principles and techniques to the production and management of plants.

PS.01. Apply knowledge of plant classification, plant anatomy, and plant physiology to the production and management of plants.

- PS.01.01. Classify agricultural plants according to taxonomy systems.
- PS.01.02. Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.
- PS.01.03. Apply knowledge of plant physiology and energy conversion to plant systems.

PS.02. Prepare and implement a plant management plan that addresses the influence of environmental factors, nutrients, and soil on plant growth.

- PS.02.01. Determine the influence of environmental factors on plant growth.
- PS.02.02. Prepare growing media for use in plant systems.
- PS.02.03. Develop and implement a fertilization plan for specific plants or crops.

PS.03. Propagate, culture, and harvest plants.

PS.03.01 Demonstrate plant propagation techniques.
PS.03.02. Develop and implement a plant management plan for crop production.
PS.03.03. Develop and implement a plan for integrated pest management.
PS.03.04. Apply principles and practices of sustainable agriculture to plant production.
PS.03.05 Harvest, handle, and store crops.

PS.04. Employ elements of design to enhance an environment.

PS.04.01. Create designs using plants.

AT - POWER, STRUCTURAL, AND TECHNICAL SYSTEMS

Pathway Content Standard: The student will demonstrate competence in the application of principles and techniques for the development and management of power, structural, and technical systems.

PST.01. Use physical science principles and engineering applications with power, structural, and technical systems to solve problems and improve performance.

PST.01.01. Select energy sources in power generation appropriate to the situation.
PST.01.02. Apply physical science laws and principles to identify, classify, and use lubricants.
PST.01.03. Identify and use hand and power tools and equipment for service, construction, and fabrication.

PST.02. Design, operate, and maintain mechanical equipment, structures, biological systems, land treatment, power, and technology.

PST.02.01. Perform service routines to maintain power units and equipment.
PST.02.02. Operate, service, and diagnose the condition of power units and equipment.

PST.03. Service and repair mechanical equipment and power systems.

PST.03.01. Troubleshoot and repair internal combustion engines.
PST.03.02. Utilize manufacturers' guidelines to service and repair the power transmission systems of equipment.
PST.03.03. Service and repair hydraulic and pneumatic systems.
PST.03.04. Troubleshoot and service electrical systems.
PST.03.05. Service vehicle heating and air-conditioning systems.
PST.03.06. Service and repair steering, suspension, traction, and vehicle performance systems.

PST.04. Plan, build, and maintain agricultural structures.

PST.04.01. Create sketches and plans of agricultural structures.
PST.04.02. Apply structural plans, specifications, and building codes.
PST.04.03. Examine structural requirements for materials and procedures, and estimate construction cost.
PST.04.05. Follow architectural and mechanical plans to construct and/or repair equipment, buildings, and facilities.

PST.05. Apply technology principles in the use of agricultural technical systems.

PST.05.01. Use instruments and meters to test and monitor electrical and electronic processes.

PST.05.02. Prepare and/or use electrical drawings to design, install, and troubleshoot control systems.

PST.05.03. Use geospatial technologies in agricultural applications.

Appendix C: 21st Century Skills[1]

AMP I	Units	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
21st Century Standards							
CS1							
CS2							
CS3							
CS4			X				
CS5			X				
CS6				X	X	X	X
CS7			X	X	X	X	X
CS8		X	X	X	X	X	X
CS9							
CS10							
CS11							
CS12		X	X	X	X	X	X
CS13		X	X	X	X	X	X
CS14		X	X	X	X	X	X
CS15		X	X	X	X	X	X
CS16		X	X	X	X	X	X

CSS1-21st Century Themes

CS1 Global Awareness

1. Using 21st century skills to understand and address global issues
2. Learning from and working collaboratively with individuals representing diverse cultures, religions, and lifestyles in a spirit of mutual respect and open dialogue in personal, work, and community contexts
3. Understanding other nations and cultures, including the use of non-English languages

CS2 Financial, Economic, Business, and Entrepreneurial Literacy

1. Knowing how to make appropriate personal economic choices
2. Understanding the role of the economy in society
3. Using entrepreneurial skills to enhance workplace productivity and career options

CS3 Civic Literacy

1. Participating effectively in civic life through knowing how to stay informed and understanding governmental processes
2. Exercising the rights and obligations of citizenship at local, state, national, and global levels
3. Understanding the local and global implications of civic decisions

CS4 Health Literacy

1. Obtaining, interpreting, and understanding basic health information and services and using such information and services in ways that enhance health
2. Understanding preventive physical and mental health measures, including proper diet, nutrition, exercise, risk avoidance, and stress reduction
3. Using available information to make appropriate health-related decisions
4. Establishing and monitoring personal and family health goals
5. Understanding national and international public health and safety issues

[1] *21st century skills.* (n.d.). Washington, DC: Partnership for 21st Century Skills.

CS5 Environmental Literacy

1. Demonstrate knowledge and understanding of the environment and the circumstances and conditions affecting it, particularly as relates to air, climate, land, food, energy, water, and ecosystems.
2. Demonstrate knowledge and understanding of society's impact on the natural world (e.g., population growth, population development, resource consumption rate, etc.).
3. Investigate and analyze environmental issues, and make accurate conclusions about effective solutions.
4. Take individual and collective action toward addressing environmental challenges (e.g., participating in global actions, designing solutions that inspire action on environmental issues).

CSS2-Learning and Innovation Skills

CS6 Creativity and Innovation

1. Think Creatively
2. Work Creatively with Others
3. Implement Innovations

CS7 Critical Thinking and Problem Solving

1. Reason Effectively
2. Use Systems Thinking
3. Make Judgments and Decisions
4. Solve Problems

CS8 Communication and Collaboration

1. Communicate Clearly
2. Collaborate with Others

CSS3-Information, Media and Technology Skills

CS9 Information Literacy

1. Access and Evaluate Information
2. Use and Manage Information

CS10 Media Literacy

1. Analyze Media
2. Create Media Products

CS11 ICT Literacy

1. Apply Technology Effectively

CSS4-Life and Career Skills

CS12 Flexibility and Adaptability

1. Adapt to change
2. Be Flexible

CS13 Initiative and Self-Direction

1. Manage Goals and Time
2. Work Independently
3. Be Self-directed Learners

CS14 Social and Cross-Cultural Skills

1. Interact Effectively with others
2. Work Effectively in Diverse Teams

CS15 Productivity and Accountability

1. Manage Projects
2. Produce Results

CS16 Leadership and Responsibility

1. Guide and Lead Others
2. Be Responsible to Others

Appendix D: Common Core Standards

APM I	Units	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9
Common Core Standards										
RL.11.1.										
RL.11.2.										
RL.11.3.										
RL.11.4.										
RL.11.5.										
RL.11.6.										
RL.11.7.										
RL.11.8.										
RL.11.9.										
RL.11.10.										
RI.11.1.										
RI.11.2.										
RI.11.3.			X	X	X	X	X	X	X	X
RI.11.4.			X	X	X	X	X	X	X	X
RI.11.5.			X	X	X	X	X	X	X	X
RI.11.6.										
RI.11.7.		X	X	X	X	X	X	X	X	X
RI.11.8.										
RI.11.9.										
RI.11.10.										
W.11.1.		X								
W.11.2.										
W.11.3.										
W.11.4.		X								
W.11.5.		X								
W.11.6.		X								
W.11.7.		X								
W.11.8.		X								
W.11.9.		X								
W.11.10.										
SL.11.1.		X								
SL.11.2.		X								
SL.11.3.		X								
SL.11.4.		X								
SL.11.5.		X								
SL.11.6.		X								
L.11.1.		X								
L.11.2.		X								
L.11.3.		X								
L.11.4.		X								
L.11.5.		X								
L.11.6.										
RH.11.1.										
RH.11.2.										
RH.11.3.										
RH.11.4.										
RH.11.5.										
RH.11.6.										
RH.11.7.										
RH.11.8.										
RH.11.9.										
RH.11.10.										
RST.11.1.		X								
RST.11.2.		X								
RST.11.3.		X								
RST.11.4.		X								
RST.11.5.		X								
RST.11.6.		X								

RST.11.7.		X								
RST.11.8.		X								
RST.11.9.		X								
RST.11.10.		X								
WHST.11.1.										
WHST.11.2.										
WHST.11.3.										
WHST.11.4.		X								
WHST.11.5.		X								
WHST.11.6.										
WHST.11.7.		X								
WHST.11.8.		X								
WHST.11.9.										
WHST.11.10.										

Reading Standards for Literature (11-12)

College and Career Readiness Anchor Standards for *Reading Literature*

Key Ideas and Details

RL.11.1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

RL.11.2. Determine two or more themes or central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account; provide an objective summary of the text.

RL.11.3. Analyze the impact of the author's choices regarding how to develop and relate elements of a story or drama (e.g., where a story is set, how the action is ordered, how the characters are introduced and developed).

Craft and Structure

RL.11.4. Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful. (Include Shakespeare as well as other authors.)

RL.11.5. Analyze how an author's choices concerning how to structure specific parts of a text (e.g., the choice of where to begin or end a story, the choice to provide a comedic or tragic resolution) contribute to its overall structure and meaning as well as its aesthetic impact.

RL.11.6. Analyze a case in which grasping point of view requires distinguishing what is directly stated in a text from what is really meant (e.g., satire, sarcasm, irony, or understatement).

Integration of Knowledge and Ideas

RL.11.7. Analyze multiple interpretations of a story, drama, or poem (e.g., recorded or live production of a play or recorded novel or poetry), evaluating how each version interprets the source text. (Include at least one play by Shakespeare and one play by an American dramatist.)

RL.11.8. (Not applicable to literature)

RL.11.9. Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics.

Range of Reading and Level of Text Complexity

RL.11.10. By the end of grade 11, read and comprehend literature, including stories, dramas, and poems, in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.
By the end of grade 12, read and comprehend literature, including stories, dramas, and poems, at the high end of the grades 11–CCR text complexity band independently and proficiently.

Reading Standards for Informational Text (11-12)

College and Career Readiness Anchor Standards for *Informational Text*

Key Ideas and Details

RI.11.1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

RI.11.2. Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to provide a complex analysis; provide an objective summary of the text.

RI.11.3. Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.

Craft and Structure

RI.11.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze how an author uses and refines

the meaning of a key term or terms over the course of a text (e.g., how Madison defines faction in Federalist No. 10).

RI.11.5. Analyze and evaluate the effectiveness of the structure an author uses in his or her exposition or argument, including whether the structure makes points clear, convincing, and engaging.

RI.11.6. Determine an author's point of view or purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, persuasiveness, or beauty of the text.

Integration of Knowledge and Ideas

RI.11.7. Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

RI.11.8. Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning (e.g., in U.S. Supreme Court majority opinions and dissents) and the premises, purposes, and arguments in works of public advocacy (e.g., The Federalist, presidential addresses).

RI.11.9. Analyze seventeenth-, eighteenth-, and nineteenth-century foundational U.S. documents of historical and literary significance (including The Declaration of Independence, the Preamble to the Constitution, the Bill of Rights, and Lincoln's Second Inaugural Address) for their themes, purposes, and rhetorical features.

Range of Reading and Level of Text Complexity

RI.11.10. By the end of grade 11, read and comprehend literary nonfiction in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.
By the end of grade 12, read and comprehend literary nonfiction at the high end of the grades 11–CCR text complexity band independently and proficiently.

College and Career Readiness Anchor Standards for *Writing*

Text Types and Purposes

W.11.1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences claim(s), counterclaims, reasons, and evidence.

b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.

c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

e. Provide a concluding statement or section that follows from and supports the argument presented.

W.11.2. Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

a. Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

c. Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

d. Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.

e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

W.11.3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

a. Engage and orient the reader by setting out a problem, situation, or observation and its significance, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.

b. Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters

c. Use a variety of techniques to sequence events so that they build on one another to create a coherent whole and build toward a particular tone and outcome (e.g., a sense of mystery, suspense, growth, or resolution).

d. Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.
e. Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.

Production and Distribution of Writing

W.11.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)

W.11.5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (Editing for conventions should demonstrate command of Language standards 1–3 up to and including grades 11–12 on page 54.)

W.11.6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Research to Build and Present Knowledge

W.11.7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

W.11.8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

W.11.9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

a. Apply grades 11–12 Reading standards to literature (e.g., "Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics").

b. Apply grades 11–12 Reading standards to literary nonfiction (e.g., "Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning [e.g., in U.S. Supreme Court Case majority opinions and dissents] and the premises, purposes, and arguments in works of public advocacy [e.g., The Federalist, presidential addresses]").

Range of Writing

W.11.10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

College and Career Readiness Anchor Standards for *Speaking and Listening*

Comprehension and Collaboration

SL.11.1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.

b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.

c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.

d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.

SL.11.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

SL.11.3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.

Presentation of Knowledge and Ideas

SL.11.4. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

SL.11.5. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

SL.11.6. Adapt speech to a variety of contexts and tasks, demonstrating a command of formal English when indicated or appropriate. (See grades 11–12 Language standards 1 and 3 on page 54 for specific expectations.)

College and Career Readiness Anchor Standards for *Language*

Conventions of Standard English

L.11.1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

a. Apply the understanding that usage is a matter of convention, can change over time, and is sometimes contested.

b. Resolve issues of complex or contested usage, consulting references (e.g., Merriam-Webster's Dictionary of English Usage, Garner's Modern American Usage) as needed.

L.11.2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

a. Observe hyphenation conventions.

b. Spell correctly.

Knowledge of Language

L.11.3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

a. Vary syntax for effect, consulting references (e.g., Tufte's Artful Sentences) for guidance as needed; apply an understanding of syntax to the study of complex texts when reading.

Vocabulary Acquisition and Use

L.11.4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, choosing flexibly from a range of strategies.

a. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., conceive, conception, conceivable).

c. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, its etymology, or its standard usage.

d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

L.11.5. Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

a. Interpret figures of speech (e.g., hyperbole, paradox) in context and analyze their role in the text.
b. Analyze nuances in the meaning of words with similar denotations.

L.11.6. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Reading Standards for Literacy in History/Social Studies (11-12)

Key Ideas and Details

RH.11.1 Cite specific textual evidence to support analysis of primary and secondary sources, connecting insights gained from specific details to an understanding of the text as a whole.

RH.11.2. Determine the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas

RH.11.3. Evaluate various explanations for actions or events and determine which explanation best accords with textual evidence, acknowledging where the text leaves matters uncertain

Craft and Structure

RH.11.4. Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text (e.g., how Madison defines faction in Federalist No. 10).

RH.11.5. Analyze in detail how a complex primary source is structured, including how key sentences, paragraphs, and larger portions of the text contribute to the whole.

RH.11.6. Evaluate authors' differing points of view on the same historical event or issue by assessing the authors' claims, reasoning, and evidence.

Integration of Knowledge and Ideas

RH.11.7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

RH.11.8. Evaluate an author's premises, claims, and evidence by corroborating or challenging them with other information.

RH.11.9. Integrate information from diverse sources, both primary and secondary, into a coherent understanding of an idea or event, noting discrepancies among sources.

Range of Reading and Level of Text Complexity

RH.11.10. By the end of grade 12, read and comprehend history/social studies texts in the grades 11–CCR text complexity band independently and proficiently.

Reading Standards for Literacy in Science and Technical Subjects (11-12)

Key Ideas and Details

RST.11.1. Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

RST.11.2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

RST.11.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Craft and Structure

RST.11.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

RST.11.5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.

RST.11.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

Integration of Knowledge and Ideas

RST.11.7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

RST.11.8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

RST.11.9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

Range of Reading and Level of Text Complexity

RST.11.10. By the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently.

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

Text Types and Purposes

WHST.11.1. Write arguments focused on discipline-specific content.

a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.

b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.

c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

e. Provide a concluding statement or section that follows from or supports the argument presented.

WHST.11.2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.

e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).

WHST.11.3. (Not applicable as a separate requirement)

Production and Distribution of Writing

WHST.11.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

WHST.11.5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

WHST.11.6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Research to Build and Present Knowledge

WHST.11.7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

WHST.11.8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

WHST.11.9. Draw evidence from informational texts to support analysis, reflection, and research.

Range of Writing

WHST.11.10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Appendix F: National Educational Technology Standards for Students (NETS-S)

AMP I	Course	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
NETS Standards							
T1		X					
T2		X					
T3		X					
T4		X	X	X	X	X	X
T5		X	X	X	X	X	X
T6		X	X	X	X	X	X

T1 Creativity and Innovation
T2 Communication and Collaboration
T3 Research and Information Fluency
T4 Critical Thinking, Problem Solving, and Decision Making
T5 Digital Citizenship
T6 Technology Operations and Concepts

T1 Creativity and Innovation
Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. Students do the following:

a. Apply existing knowledge to generate new ideas, products, or processes.
b. Create original works as a means of personal or group expression.
c. Use models and simulations to explore complex systems and issues.
d. Identify trends and forecast possibilities.

T2 Communication and Collaboration
Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. Students do the following:

a. Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media.
b. Communicate information and ideas effectively to multiple audiences using a variety of media and formats.
c. Develop cultural understanding and global awareness by engaging with learners of other cultures.
d. Contribute to project teams to produce original works or solve problems.

T3 Research and Information Fluency
Students apply digital tools to gather, evaluate, and use information. Students do the following:

a. Plan strategies to guide inquiry.

b. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
c. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks.
d. Process data and report results.

T4 Critical Thinking, Problem Solving, and Decision Making

Students use critical-thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. Students do the following:

a. Identify and define authentic problems and significant questions for investigation.
b. Plan and manage activities to develop a solution or complete a project.
c. Collect and analyze data to identify solutions and/or make informed decisions.
d. Use multiple processes and diverse perspectives to explore alternative solutions.

T5 Digital Citizenship

Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. Students do the following:

a. Advocate and practice safe, legal, and responsible use of information and technology.
b. Exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity.
c. Demonstrate personal responsibility for lifelong learning.
d. Exhibit leadership for digital citizenship.

T6 Technology Operations and Concepts

Students demonstrate a sound understanding of technology concepts, systems, and operations. Students do the following:

a. Understand and use technology systems.
b. Select and use applications effectively and productively.
c. Troubleshoot systems and applications.
d. Transfer current knowledge t