COURSE: Foundations of Engineering and Technology

UNIT: 11: Communications Systems

INTRODUCTION

Annotation: Briefly describe the unit topics, tasks, methods, etc.

This unit will introduce students to communications technologies. Students will examine the primary purpose of communication and some of the basic models associated with all forms of communication.

Grade(s):

X	9th
X	10th
X	11th
X	12th

Time:

10 hours

Author:

Charles J. Kachmer

Additional Author(s):

Students with Disabilities:

For students with disabilities, the instructor should refer to the student's IEP to be sure that the accommodations specified are being provided. Instructors should also familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation.

FOCUS STANDARDS

GPS Focus Standards: Please list the standard and elements covered.

ENGR-FET-2a – Identify key historical events and their impact on engineering and technology.
ENGR-FET-2b – Describe the issues of wealth, fame, power, and necessity that have influenced innovation and technological development.
ENGR-FET-2e – Explain the interaction between technological development and social change.
ENGR-FET-3a – Describe the processes of input, processing, output, and feedback that comprise the universal systems model.
ENGR-FET-3b – Demonstrate applications of the universal systems model across the spectrum of technologies.
ENGR-STEM-1 – Students will recognize the systems, components, and processes of a technological system.
ENGR-STEM-2 – Students will identify the impact of engineering and technology within global, economic, environmental, and societal contexts.
ENGR-STEM-5 – Students will select and demonstrate techniques, skills, tools, and understanding related to energy and power, bio-related, communication, transportation, manufacturing, and construction technologies.
ENGR-STEM-6 – Students will enhance reading by developing vocabulary and comprehension skills associated with text materials, problem descriptions, and laboratory activities associated with engineering and technology education.
CTAE-FS-1 – Career Development: Learners plan and manage academic-career plans and employment relations.
CTAE-FS-3 – Communications: Learners use various communication skills in expressing and interpreting information.
CTAE-FS-4 – Problem Solving and Critical Thinking: Learners define and solve problems, and use problem-solving and improvement methods and tools.
CTAE-FS-5 – Information Technology Applications: Learners use multiple information technology devices to access, organize, process, transmit, and communicate information.

GPS Academic Standards:

ELAALRC2 The student participates in discussions related to curricular learning in all subject areas.
ELAALRC3 The student acquires new vocabulary in each content area and uses it correctly.
ELAALRC4 The student establishes a context for information acquired by reading across subject areas.
MM3P1. Students will solve problems (using appropriate technology).
MM3P2. Students will reason and evaluate mathematical arguments.
MM3P4. Students will make connections among mathematical ideas and to other disciplines.
SCSh1. Students will evaluate the importance of curiosity, honesty, openness, and skepticism in science.
SCSh2. Students will use standard safety practices for all classroom laboratory and field investigations.
SCSh3. Students will identify and investigate problems scientifically.
SCSh4. Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.
SCSh5. Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations.
SCSh7. Students analyze how scientific knowledge is developed.
SCSh8. Students will understand important features of the process of scientific inquiry.
SSUSH11 The student will describe the growth of big business and technological innovations after Reconstruction.
SSUSH21 The student will explain economic growth and its impact on the United States 1945-1970.

SSUSH24 The student will analyze the impact of social change movements and organizations of the 1960's.
SSWH21 The student will analyze globalization in the contemporary world.

National / Local Standards / Industry / ISTE:

UNDERSTANDINGS & GOALS

Enduring Understandings: Enduring understandings are statements summarizing important ideas and have lasting value beyond the classroom. They synthesize what students should understand – not just know.

The student will gain a basic understanding of the progression of communication technologies and its economic, social and environmental impacts.

Essential Questions: Essential questions probe for deeper meaning and understanding while fostering the development of critical thinking and problem-solving skills. Example: Why is life-long learning important in the modern workplace?

1. What events are important in the history of communications systems?
2. What effects have advances in communication technologies had on social behavior?
3. What are the differences between analog and digital communications technologies?
4. What are the various forms of transmitting technologies?
5. What is the primary purpose of communication?
6. What are the essential elements of all communication systems models?

Knowledge from this Unit: Factual information.

1. Students will know the difference between analog and digital communications.
2. Students will know the basics of how satellites work to produce communications.
3. Students will know the history of communication technologies.

Skills from this Unit: Performance.

1. Students will be able to list the components in communication systems.
2. Students will describe the various forms of transmitting communications.
3. Students will analyze and contrast different communication systems.

ASSESSMENT(S)

Assessment Method Type: Select one or more of the following. Please consider the type(s) of differentiated instruction you will be using in the classroom.

____ Pre-test
X Objective assessment - multiple-choice, true- false, etc.
__ Quizzes/Tests
_X_ Unit test
____ Group project
X Individual project
____ Self-assessment - May include practice quizzes, games, simulations, checklists, etc.
__ Self-check rubrics
__ Self-check during writing/planning process
__ Journal reflections on concepts, personal experiences and impact on one's life
__ Reflect on evaluations of work from teachers, business partners, and competition judges
__ Academic prompts
__ Practice quizzes/tests
____ Subjective assessment/Informal observations
__ Essay tests
__ Observe students working with partners
__ Observe students role playing
X Peer-assessment
__ Peer editing & commentary of products/projects/presentations using rubrics
_X_ Peer editing and/or critiquing
X Dialogue and Discussion
__ Student/teacher conferences
__ Partner and small group discussions
_X_ Whole group discussions
__ Interaction with/feedback from community members/speakers and business partners
X Constructed Responses
__ Chart good reading/writing/listening/speaking habits
_X_ Application of skills to real-life situations/scenarios
X Post-test

Assessment(s) Title:

Communications Systems PowerPoint Project

Assessment(s) Description/Directions:

Students are to examine one communication technology system and provide the class with an in-depth presentation. Minimum requirements of the presentation can be found below in the assessment rubric. The assignment sheet and requirements can also be found in the document titled Communications Systems PowerPoint Project, an instructional material accompanying this lesson.

Attachments for Assessment(s): Please list.

Rubric for Assessment:

Slide	Requirements	Points Possible	Points Earned
Overall	5 slide minimum	10	
Overall	4 graphics/photographs	10	
Overall	2 sound bytes	10	
Overall	3 separate references (web-sites are acceptable)	10	
1	Name of communication technology, your name, course and date	5	
2	Date the communication technology was introduced or patented, and person or company credited with innovation or invention	15	
3	Description of the technology and how it works	20	
4	Explanation of the social change that this technology brought about Example: drive thru technologies have impacted the relationship we have with local merchants	15	
5	Bibliography, including books, web-sites used for information, and photographs	5	
TOTAL:		100	

LEARNING EXPERIENCES

Sequence of Instruction

1. Identify the Standards. Standards should be posted in the classroom for each lesson.

ENGR-FET-2a – Identify key historical events and their impact on engineering and technology.
ENGR-FET-2b – Describe the issues of wealth, fame, power, and necessity that have influenced innovation and technological development.
ENGR-FET-2e – Explain the interaction between technological development and social change.
ENGR-FET-3a – Describe the processes of input, processing, output, and feedback that comprise the universal systems model.
ENGR-FET-3b – Demonstrate applications of the universal systems model across the spectrum of technologies.
ENGR-STEM-1 – Students will recognize the systems, components, and processes of a technological system.
ENGR-STEM-2 – Students will identify the impact of engineering and technology within global, economic, environmental, and societal contexts.

ENGR-STEM-5 – Students will select and demonstrate techniques, skills, tools, and understanding related to energy and power, bio-related, communication, transportation, manufacturing, and construction technologies.
ENGR-STEM-6 – Students will enhance reading by developing vocabulary and comprehension skills associated with text materials, problem descriptions, and laboratory activities associated with engineering and technology education.
CTAE-FS-1 – Career Development: Learners plan and manage academic-career plans and employment relations.
CTAE-FS-3 – Communications: Learners use various communication skills in expressing and interpreting information.
CTAE-FS-4 – Problem Solving and Critical Thinking: Learners define and solve problems, and use problem-solving and improvement methods and tools.
CTAE-FS-5 – Information Technology Applications: Learners use multiple information technology devices to access, organize, process, transmit, and communicate information.

2. Review Essential Questions.

1. What events are important in the history of communications systems?
2. What effects have advances in communication technologies had on social behavior?
3. What are the differences between analog and digital communications technologies?
4. What are the various forms of transmitting technologies?
5. What is the primary purpose of communication?
6. What are the essential elements of all communication systems models?

3. Identify and review the unit vocabulary.

See attached vocabulary sheet

4. Assessment Activity.

1. Teach students the communications systems concepts using the PowerPoint titled Communications Systems.
2. Assignment 1: Communications Systems PowerPoint Project. Directions and rubric can be found under Balanced Assessment above, as well as the Word document titled Communications Systems PowerPoint Project
3. Allow students to present their communication technology PowerPoint to the class.
4. Assignment 2: Communications Systems Vocabulary. Directions can be found under Unit Performance Task(s) above and the worksheet can be found as an instructional material titled Communications Systems Vocabulary
5. Assignment 3: Personal Use of Communication Devices. Directions can be found under Unit Performance Task(s) above and the Excel spreadsheet can be found as an instructional material titled Personal Use of Communication Devices. Allow time for students to compare their usage with the rest of the class.
6. Assignment 4: Morse Code. Directions can be found under Unit Performance Task(s) above.

Attachments for Learning Experiences: Please list.

PowerPoint: Communication Systems
Word Documents: Communications Systems PowerPoint Project

Notes & Reflections: May include notes to the teacher, pre-requisite knowledge & skills, suggestions, etc.

CULMINATING PERFORMANCE TASK (Optional)

Culminating Unit Performance Task Title:

Assignment 2: Communications Systems Vocabulary
Assignment 3: Personal Use of Communication Devices
Assignment 4: Morse Code

Culminating Unit Performance Task Description/Directions/Differentiated Instruction:

1. Have students complete the Communications Systems vocabulary sheet (titled Communications Systems Vocabulary under instructional materials) over the course of this unit. Students may use the PowerPoint, textbook, and any other resources to complete the worksheet.
2. Using the Excel spreadsheet titled Personal Use of Communication Devices, have students keep track of their use of electronic communication devices. Students should list the devices they use, including but not limited to: cell phones, computer with or without the internet, text messaging, iPod, video games, television, land phone, and email. Make sure that students try to list items they may not automatically think of, such as purchasing an item by scanning a barcode or debit card, washing hands in a lavatory where the faucet is on a sensor, stopping at an intersection under camera surveillance, electronic traffic signals or electronic communication devices in your car (signal lights, etc.). Students should then tabulate their finding and create a pie chart on their daily use. An example pie chart can be found on the spreadsheet. Finally, have students compare their usage with the rest of the class.
3. Using an old set of walkie talkies, have students send messages to their classmates using Morse code. The international Morse code characters are listed on this lesson's PowerPoint.

Attachments for Culminating Performance Task: Please list.

Word Documents: Communication Systems Vocabulary (Assignment 2)
Excel Spreadsheets: Personal Use of Communication Devices (Assignment 3)

UNIT RESOURCES

Web Resources:

Video Links (videos are also linked in the PowerPoint):
How TV Works: http://youtube.com/watch?v=TE_agdPYYWQ&feature=related
Analog vs. Digital: http://www.youtube.com/watch?v=kR7227_ndqQ
Telegraph MIT: http://www.youtube.com/watch?v=3tDX85ZK14Q
CNC Milling Machine: http://www.youtube.com/watch?v=Wk2VYwCIcZE
How Satellites Work: http://www.youtube.com/watch?v=J4gGalZV8TM
Inventoon – The Telephone: http://www.youtube.com/watch?v=HXBl9dg3YhE

Attachment(s): Supplemental files not listed in assessment, learning experiences, and performance task.

Materials & Equipment:

Powerpoint display, computer with internet access

What 21st Century Technology was used in this unit:

X	Slide Show Software		Graphing Software		Audio File(s)
	Interactive Whiteboard		Calculator	X	Graphic Organizer
	Student Response System		Desktop Publishing	X	Image File(s)
	Web Design Software		Blog	X	Video
	Animation Software		Wiki		Electronic Game or Puzzle Maker
	Email	X	Website		