WARREN COUNTY SCHOOL DISTRICT

VIRTUAL PLANNED INSTRUCTION

COURSE DESCRIPTION

Course Title: Engineering & Technology
Course Number: 10725
Course Prerequisites: None

Course Description: See Attachment

Suggested Grade Level: Grades 9-12
Length of Course: One Semester
Units of Credit: .5
PDE Certification and Staffing Policies and Guidelines (CSPG) Required Teacher Certifications:
CSPG 65
To find the CSPG information, go to https://www.education.pa.gov/Educators/Certification/Staffing%20Guidelines/Pages/default.aspx
Certification verified by the WCSD Human Resources Department: ☒Yes ☐No

WCSD STUDENT DATA SYSTEM INFORMATION

Course Level: Academic
Mark Types: Check all that apply.
☒F – Final Average ☒MP – Marking Period ☐EXM – Final Exam

GPA Type: ☐ GPAEL-GPA Elementary ☐ GPAML-GPA for Middle Level ☒ NHS-National Honor Society
☐ UGPA-Non-Weighted Grade Point Average ☒ GPA-Weighted Grade Point Average

State Course Code: 21003

To find the State Course Code, go to https://nces.ed.gov/forum/sced.asp, download the Excel file for *SCED*, click on SCED 6.0 tab, and chose the correct code that corresponds with the course.

TEXTBOOKS AND SUPPLEMENTAL MATERIALS

Supplemental Materials: Edynamic (Virtual Academy)

Curriculum Document

WCSD Board Approval:
Date Finalized: 9/19/2019
Date Approved: 11/4/2019
Implementation Year: 19-20

SPECIAL EDUCATION, 504, and GIFTED REQUIREMENTS

The teacher shall make appropriate modifications to instruction and assessment based on a student's Individual Education Plan (IEP), Chapter 15 Section 504 Plan (504), and/or Gifted Individual Education Plan (GIEP).

ASSESSMENTS

PSSA Academic Standards, Assessment Anchors, and Eligible Content: The teacher must be knowledgeable of the PDE Academic Standards, Assessment Anchors, and Eligible Content and incorporate them regularly into planned instruction.

Formative Assessments: The teacher will utilize a variety of assessment methods to conduct in-process evaluations of student learning.

Effective formative assessments for this course include: Lesson quizzes, projects, discussion boards, and module exams

Summative Assessments: The teacher will utilize a variety of assessment methods to evaluate student learning at the end of an instructional task, lesson, and/or unit.

Effective summative assessments for this course include: Semester exams

Concepts of Engineering and Technology

Each day, we are surrounded by technology and engineering projects. From our phones to the bridges we drive over, engineering and technology influence many parts of our lives. In Concepts of Engineering and Technology, you will learn more about engineering and technology careers and what skills and knowledge you'll need to succeed in these fields. You'll explore innovative and cutting-edge projects that are changing the world we live in and examine the design and prototype development process. Concepts of Engineering and Technology will also help you understand the emerging issues in this exciting career field.

Unit 1: Development & Understanding of Engineering

Have you ever wondered how civilization continues to design, build, and improve machines and structures around the world? Looking at the skyline of any major city, you can see a crazy number of tall buildings, lengthy bridges, and engines purring under endless equipment. We all know these inventions are critical to our modern way of life, yet we don’t always understand the knowledge required to create such innovation. Have you ever peered up at a towering skyscraper and marveled at the mere impossibility of it? It is, in fact, not only possible but also just part of a day’s work for an engineer. In this course, you’ll be exploring the various fields of this occupation, its history, the important role it plays in human life, and the ethical issues related to engineering. So buckle up; here we go!

What will you learn in this unit?

- Distinguish the differences between science, technology, and engineering.
- Understand and use technical terms.
- Discuss important technological developments from the past.
- Identify the various technological ages and the rate of current development.
- Discuss some of the ethical concerns around technology.

Unit 1 Assignments

Assignment	Type
Unit 1 Text Questions	Homework
Unit 1 Lab	Homework
Unit 1 Activity	Homework
Unit 1 Discussion 1	Discussion
Unit 1 Discussion 2	Discussion
Unit 1 Quiz	Discussion

Unit 2: Making Problems into Ideas

It’s easy to identify a problem but not always as easy to figure out a solution. An engineer’s job is to take pesky things like problems and apply a functional process that will eventually result in a technological solution. That problem-solving process involves a series of important steps, steps

that are imperative for success. Understanding these techniques is critical for an engineer, as is knowing the differences among the various technological systems that aid in the process. You could say that an engineer has a sizeable toolbox of strategies at his disposal. This unit will explain those tools and how they can best be used on the job. It will also help you to develop your own process through the development of an engineering notebook.

What will you learn in this unit?

- Discuss open and closed systems.
- Identify how technological systems interact to achieve goals.
- Find technological solutions through problem solving.
- Design and maintain a computation engineering notebook.

Unit 2 Assignments

Assignment	Type
Unit 2 Text Questions	Homework
Unit 2 Lab	Homework
Unit 2 Activity	Homework
Unit 2 Discussion 1	Discussion
Unit 2 Discussion 2	Discussion
Unit 2 Quiz	Discussion

Unit 3: From Sketches to Products

As an engineer, you will likely find yourself in a situation where you know exactly what you want to build, but the only problem is your ideas are stuck in your head. Finding a way to express ideas and bring them to fruition is a challenge, even for an engineer, and understanding the design process is a critical part of the course of action. Obviously, designing something requires that you also have a firm grasp on the materials needed and how they are characterized within an experiment. Simply put, this means engineers must conceptualize their goals while remembering the pragmatic elements required to achieve them. *How can I get what I want with what I have?* Working out a design process is a balancing act between the creative and the scientific worlds. Having a vision is essential, but understanding the reality of how to achieve that vision is equally important. You can’t have one without the other.

What will you learn in this unit?

- Describe the fundamental processes needed for a project, including design and prototype development.
- Identify the chemical, mechanical, and physical properties of engineering materials.
- Assess risks and benefits of a design solution.
- Maintain a professional portfolio.

Unit 3 Assignments

Assignment	Type
Unit 3 Text Questions	Homework
Unit 3 Lab	Homework
Unit 3 Activity	Homework
Unit 3 Discussion 1	Discussion
Unit 3 Discussion 2	Discussion
Unit 3 Quiz	Discussion

Unit 4: Civil Engineering

Are you a practical person? Do you like to see things running smoothly and efficiently? Do you worry about systems that break down and create problems? If the answers are yes, you may want to learn more about civil engineering, a field that focuses on precisely these issues in the real world. The world is filled with roads, buildings, airports, tunnels, dams, bridges, and water supply systems. The world needs a qualified person to design, build, supervise, operate, and maintain these things. And as we all know, these “things” are not negotiable. They must be supported with ideas and hard work to keep our society chugging along and, in some cases, sprinting along as we continue to evolve into an increasingly accelerated species. Civil engineering is arguably the oldest discipline in this field, dating back to 3000 BCE, and definitely one of the most pragmatic. I mean, if you don’t have a roof over your head, what do you have?

What will you learn in this unit?

- Work in teams to apply the design process.
- Assume different roles within an engineering project.
- Develop and test a project model.
- Use time-management skills to meet project objectives.
- Use criteria to meet project expectations.
- Describe and demonstrate team functions, quality, and requirements.

Unit 4 Assignments

Assignment	Type
Unit 4 Text Questions	Homework
Unit 4 Lab	Homework
Unit 4 Activity	Homework
Unit 4 Discussion 1	Discussion
Unit 4 Discussion 2	Discussion
Unit 4 Quiz	Discussion

Concepts of Engineering & Technology Midterm Exam

- Review information acquired and mastered from this course up to this point.

- Take a course exam based on material from the first four units in this course (Note: You will be able to open this exam only one time.)

Midterm Assignments

Assignment	Type
Midterm Exam	Exam
Midterm Discussion	Discussion

Unit 5: Mechanical Engineering

Were you one of those kids who liked to take things apart or, more truthfully, break them to see what was inside? Did you pull the wings off your new mechanical toy butterfly to examine how they were attached? Maybe you even managed to put it back together. These preoccupations with machinery and its secrets are also the wonderings of a mechanical engineer. How does this broad field really function? And exactly what type of engineer does it require? A mechanical engineer has a large, albeit sometimes unusual, scope of interests and plays an integral part in the running of the modern world. So maybe the kid taking the remote control apart instead of watching the actual television is on her or his way to an exciting career as a mechanical engineer.

What will you learn in this unit?

- Define and describe the applications of physical and mechanical systems.
- Describe various career opportunities and emerging issues within these fields.
- Explain the history of mechanical engineering and its current trajectory.
- Apply design concepts to problems in physical and mechanical systems.

Unit 5 Assignments

Assignment	Type
Unit 5 Text Questions	Homework
Unit 5 Lab	Homework
Unit 5 Activity	Homework
Unit 5 Discussion 1	Discussion
Unit 5 Discussion 2	Discussion
Unit 5 Quiz	Discussion

Unit 6: Chemical Engineering

If there's one word to remember today, it's creation! Creation is everything; creation is life. It's awesome to study and understand the natural world through science or identify the makeup of different substances through the wonders of chemistry; however, what does it take to use both of the disciplines of chemistry and engineering to create something entirely new? Something that can improve human life, feed the planet, save lives, and change the face of reality? As you will soon find out, it takes a chemical engineer. Chemical engineering, an incredibly complex and challenging field of engineering, is particularly exciting because of its relationship to substances

and conceptualizing how they can be used to form new ones. A chemical engineer not only has to understand science, mathematics, and chemistry but must also have the skills to funnel all that knowledge into the alchemy of any entirely new and innovative result. And voilà! Now you have creation, the essence of chemical engineering and the very essence of life.

What will you learn in this unit?

- Describe applications of process control and automation systems.
- Describe career opportunities in process control and automation systems.
- Apply design concepts and identify fields related to process control and automation systems while identifying emerging issues.
- Understand and follow safety tests and guidelines while recognizing how to classify and dispose of hazardous materials and waste.

Unit 6 Assignments

Assignment	Type
Unit 6 Text Questions	Homework
Unit 6 Lab	Homework
Unit 6 Activity 1	Homework
Unit 6 Activity 2	Homework
Unit 6 Discussion 1	Discussion
Unit 6 Discussion 2	Discussion
Unit 6 Quiz	Discussion

Unit 7: Biological Engineering

If you consider healing the world a worthwhile endeavor, then you have the spirit of a bioengineer. Nature is filled with different materials under the ground, in the sky, and far down in the murky depths of the sea. Learning how to use these organisms is key to this evolving world of discovery. The natural world continues to provide many priceless resources that we are free to use at our discretion; however, we must remember to remain ethical and thoughtful in this process so as not to deplete the world and ourselves. Unlike chemical engineering, which creates synthetic materials through nature, bioengineers simply use the materials of the earth to generate what is needed to improve human life. Just remember: biology + engineering = bioengineering. Bioengineers are the naturalists of the engineering world and some of the most effective innovators of our time.

What will you learn in this unit?

- Describe the different fields of biotechnology.
- Identify the underlying principles of bioengineering.
- Understand career opportunities, related fields, and emerging trends in biotechnology.
- Apply design concepts to problems in biotechnology.
- Discuss inherent ethical dilemmas in bioengineering and technology.

Unit 7 Assignments

Assignment	Type
Unit 7 Text Questions	Homework
Unit 7 Lab	Homework
Unit 7 Activity 1	Homework
Unit 7 Activity 2	Homework
Unit 7 Discussion 1	Discussion
Unit 7 Discussion 2	Discussion
Unit 7 Quiz	Discussion

Unit 8: Impossible Engineering!

Thinking back on all the incredible challenges engineers have overcome in their profession, it's easy to be positively astonished by the amount of innovation the world has seen. Rarely do people have the ability to predict the future, yet engineers have proved time and time again that wild dreams can eventually become reality. Looking back at all the awe-inspiring engineering developments over the years and remembering that at one time they too seemed impossible, it's safe to say society is likely in store for a lot of surprising advancements in the next hundred years. What are the areas engineers hope to develop during the 21st century? How will society look as a result? Engineers may have a lot of tools in their toolboxes, but the word impossible is definitely not one of them.

What will you learn in this unit?

- Define impossible engineering.
- Conduct and present research on emerging and innovative technology.
- Describe ethical behavior and decision making through the use of examples.
- Differentiate among discrimination, harassment, and equality.

Unit 8 Assignments

Assignment	Type
Unit 8 Text Questions	Homework
Unit 8 Lab	Homework
Unit 8 Activity	Homework
Unit 8 Discussion 1	Discussion
Unit 8 Discussion 2	Discussion
Unit 8 Quiz	Discussion

Concepts of Engineering & Technology Final Exam

- Review information acquired and mastered from this course up to this point.
- Take a course exam based on material from units five to eight in this course – the last four units. (Note: You will be able to open this exam only one time.)