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Staunton River High School

Technology Education

1095 Golden Eagle Drive

Moneta, VA 24121

(540) 297-7151 Ext. 350 FAX (540) 297-2982

Syllabus: *Engineering Analysis and Applications II (8451)*

Instructor: Dan Horine - Rooms CTE-3/CTE-4

This course will enable students to examine technology and engineering fundamentals related to solving real-world problems. Students will be exposed to a variety of engineering specialty fields and related careers to determine whether they are good candidates for post-secondary educational opportunities in engineering. Students will gain a basic understanding of engineering history and design, using mathematical and scientific concepts. Students will participate in hands-on projects in a laboratory setting as they communicate information through team-based presentations, proposals, and technical reports.

Assessments: BCPS Scale: **A** 89.5-100, **B** 79.5-89.4, **C** 69.5-79.4, **D** 59.5-69.4, **F** Below 59.4
Students will be assessed on the following:

- **Daily laboratory maintenance duty**- Students will complete duties assigned on a rotating basis. (Points will be deducted for students not passing safety tests.)
- **Tests-** Safety and topics related to material science including Tooling University (SME).
- **Quizzes/Journal Entries**- Related to the topic being studied.
- **Project work**- related to the topics being studied. Usually worth more than a test or other assignment depending on complexity of the project.
- **Homework**- Tooling U assignments may be completed at any time with internet access.
- **Notebooks**- Class lessons and machine notes should be maintained in a three ring binder dedicated to this class only. The notebook should be brought to class every day.

Weighting of each assessment area will be determined by class discussion during the first two days of class.

Safety: Students will be required to pass **safety tests with 100% accuracy** on all individual machines that are used in the lab and must pass general safety, eye protection safety and hand tool safety tests with 100% accuracy. Students will be given instruction on the safe use of each machine prior to each safety test. Each machine test can be retaken in order for the student to successfully complete each machine but only the first test will count toward the nine-weeks grade. Safety glasses/goggles must be worn while working in the laboratory area as per Virginia State Law. Closed-toed shoes are required.

Class format and student success: Class is organized around these two elements: instructional time in the classroom and hands-on time in the laboratory. Generally lesson material is covered in the first portion of the nine weeks (2-3 weeks) and the remainder of the grading period is spent applying what was learned in the classroom (6-7 weeks). Attendance is vital.

Accountability: "Students and their parents are responsible for any school property used by the student in pursuit of his/her studies that is lost, broken, destroyed, or not returned to the school. The student's parent must reimburse the school for any outstanding bills due to the lost, broken, destroyed, or unreturned school property before the student is allowed to participate in graduation ceremonies. Parents and students with financial needs may discuss a payment plan and special needs with the school principal."
This syllabus may be changed or amended at the discretion of the instructor as needed for the best

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interest of the class. Not all students will get to complete all projects but the instructor will try to maximize the experience to the student's interest and future goals. The learner will be required to complete the assignments in the order assigned by the instructor. In the event a machine is in need of repair, or materials need to be re-ordered, the schedule may also need to be altered.

Date	Topic/ Content (CBE Objectives)	Skill(s)	Assessment
Exploring Engineering Systems as Applied to Areas of the Designed World			
8/13~ 09/7	.039 Define *designed world*. .040 Describe major engineering disciplines. .036 Analyze the interdisciplinary nature of engineering projects. .037 Integrate the parts of a project. .038 Identify the impact of a design solution on industry, economy, society, and environment.	Introduction to Engineering - Review Research engineering careers Create presentation and present information on a chemical, electrical, mechanical, or civil engineering achievement.	Oral and written responses **Activity:** Research and present information on an engineering achievement **Quiz:** Engineering and its requirements and fields.
Safety			
8/22~ 10/5	.051 Demonstrate lab safety. .052 Describe hazards associated with machines and tools. .058 Identify common hand tools and fasteners.	Safety lessons and notes on general lab safety concerns. Hand Tool and Power Tool Safety lessons and notes. Develop a lab management organizational chart. Discuss the materials taught in the course.	**Safety Tests:** ***Score of 100% required.*** General Safety Eye Safety Hand tool Safety Machine Safety **Projects:** TBD **Tooling U Tests:** PPE OSHA Hand and Power Tool
Examining Engineering Materials and Manufacturing			

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10/08~ 12/19	.053 List common engineering materials and common applications of each. .054 Describe properties of engineering materials in terms of their internal structures. .055 Identify the correct engineering material for a specific function. .056 List common causes of material failure. .057 Demonstrate processes used with metal, wood, polymer, ceramic, and composite materials, including adhesives.	**Lessons:** • Wood sciences • Ceramics • Metals • Polymers • Composites	Quizzes on lessons **<u>Projects</u>:** TBD **<u>Tooling U Tests</u>:** Ceramics Structure of Metals Mech Prop. of Metals Physical Prop. Of Metals Oxy Fuel Welding Arc Welding Overview of Plastics Materials Overview of Plastics Properties Intro to Composites **<u>Mid-Term Exam</u>:** No exemptions
Examining Engineering Systems			
1/3 ~ 3/8	.059 Explore electrical systems. .060 Explain primary concepts and components of a fluid power system. .061 Identify the primary concepts and components of thermodynamic systems. .062 Identify the primary concepts and components of mechanical systems. .063 Demonstrate control of systems. .064 Design a system that transforms energy from one type to another.	AC/DC Electronic Basics VEX Robotics - building and completing challenge	**<u>Project</u>:** TBD
Applying the Engineering Design Process			

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3/11 ~ 4/12 **Spring Break** **4/15-4/19**	.039 Identify the need for a product or system. .040 Explain the validity of designing alternative solutions to an engineering design problem. .041 Design an engineering solution to a real-world problem for each of the areas in the designed world. .042 Implement a design. .043 Iterate on the solution. .044 Maintain documentation (e.g., sketches, notes, reports) .045 Present a solution.	Model Design and Testing Inventor Training - Basics	Quiz on lessons **Activities:** Design and construct a reusable rocket system Drawing full sized parts - bridge design **Projects:** TBD
Using Logic and Problem-Solving Techniques			
4/22 ~ 5/10	.046 Reverse-engineer a product, process, or idea. .047 Define *algorithm*. .048 Create an algorithm to solve an engineering problem. .049 Explain the benefits of modeling and simulation. .050 Create a model or simulation for an engineering product, process, or idea.	Out-of-the-box problem-solving methods	**Activities:** Apply and conquer problems in class given a set of specific criteria with grading rubric.

End of School Year			
5/13 ~ 05/24	Final clean-up, disassembly and review for final exam		**Final exam**

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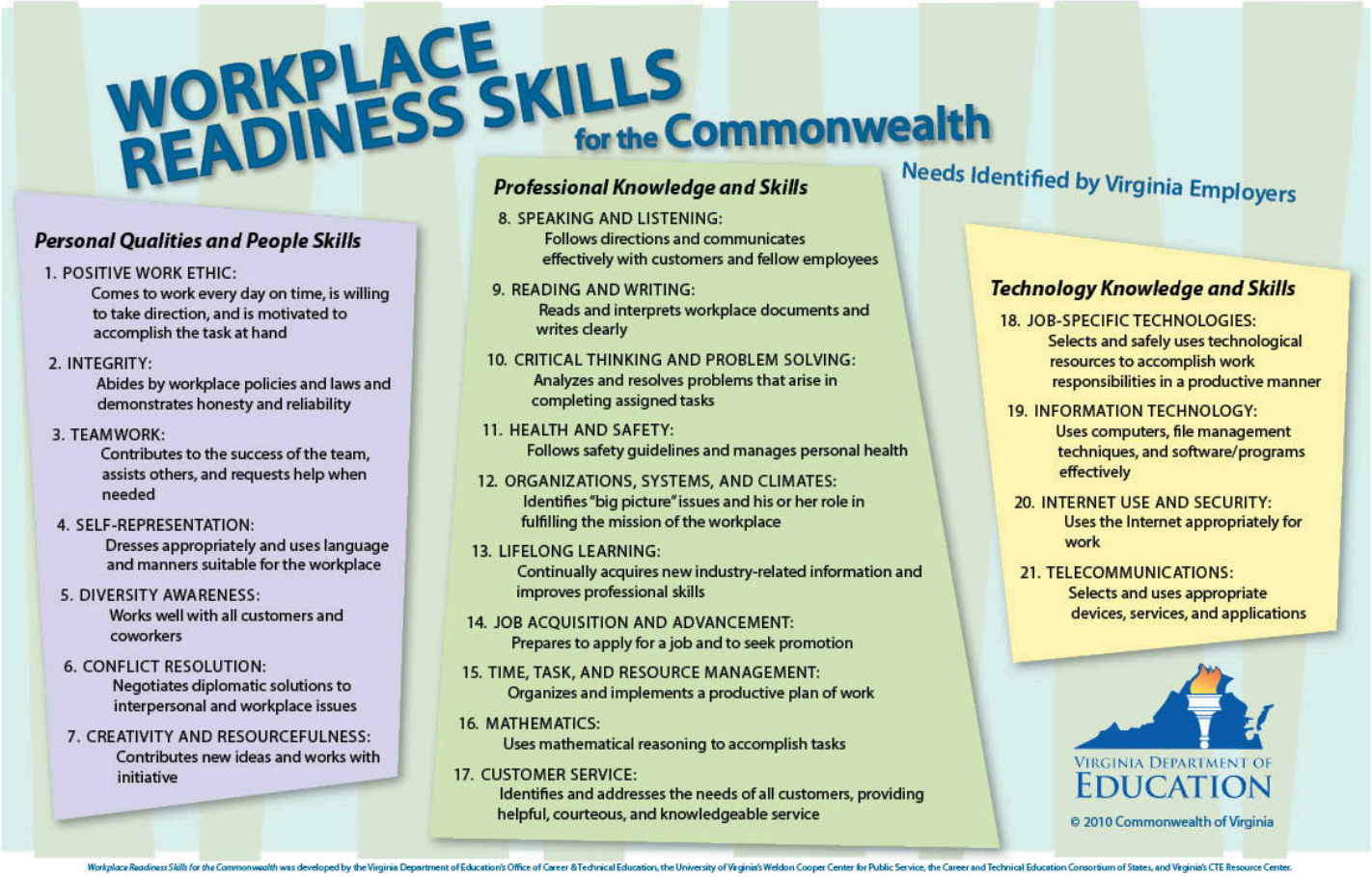
In response to the need to better prepare our students to enter the workforce and to be successful on the job, as employers have long demanded, Virginia has created an essential list of 21 workplace readiness skills. This list, endorsed by the Board of Education, is a mandatory component of every CTE course in the Commonwealth of Virginia. These competencies will be incorporated into lessons throughout the year.



Additionally, the following competencies will also be incorporated:
.022 Examine aspects of planning within an industry/organization.
.023 Examine aspects of management within an industry/organization.
.024 Examine aspects of financial responsibility within an industry/organization.
.025 Examine technical and production skills required of workers within an industry/organization.
.026 Examine principles of technology that underlie an industry/organization.
.027 Examine labor issues related to an industry/organization.
.028 Examine community issues related to an industry/organization.
.029 Examine health, safety, and environmental issues related to an industry/organization.
.030 Identify the purposes and goals of the student organization.
.031 Explain the benefits and responsibilities of membership in the student organization as a student and in professional/civic organizations as an adult.
.032 Demonstrate leadership skills through participation in student organization activities, such as meetings, programs, and projects.
.033 Identify Internet safety issues and procedures for complying with acceptable use standards.