karen.beverly@bedford.k12.va.us

Staunton River High School

Technology Education
1095 Golden Eagle Drive
Moneta, VA 24121
(540) 297-7151 Ext. 350 FAX (540) 297-2982

Syllabus: *Engineering Concepts and Processes III (8452)*

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

Engineering Concepts and Processes III is the third course of a four-course sequence that will enable students to solve real-world problems. This course focuses on building an engineering team, working with case studies, managing projects, delivering formal proposals and presentations, and examining product and process trends. In addition, students continue to apply their engineering skills to determine what postsecondary education engineering pathway they want to follow. Students will participate in STEM-based, hands-on projects 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."

karen.beverly@bedford.k12.va.us

This syllabus may be changed or amended at the discretion of the instructor as needed for the best 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
Functioning as a Team on an Engineering Project			
8/13~ 09/7	.034 Explain the purpose and functions of a project team. .035 Explain the benefits of multiple perspectives and diverse skills in solving practical engineering problems. .036 Organize a team for an engineering project. .037 Identify the steps in a team's life cycle. .038 Deliver constructive feedback. .039 Interpret constructive feedback. .040 Explain the importance of generating consensus for the project idea to team members. .041 Resolve conflicts within a team. .042 Identify active-listening techniques. .043 Explain the benefits of active listening. .044 Demonstrate formal and informal professional communication. .045 Perform self-evaluations and a team peer review.	Introduction to Engineering - Review Research engineering project teams. Create presentation and present information on teamwork of engineering projects.	Oral and written responses **Activity:** Research and present information on engineering project teams **Quiz:** Engineering and its requirements and fields.

karen.beverly@bedford.k12.va.us

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
Developing Project Management Skills in an Engineering Design Project			
10/08~ 12/19	.046 Define the five phases of a project life cycle. .047 Identify the objectives of a project. .048 Identify the components of a well-written goal. .049 Estimate the available resources for a project. .050 Allocate resources. .051 Demonstrate the use of project management tools. .052 Prioritize the procedures to complete a project. .053 Identify ways to motivate individuals and teams. .054 Assign tasks to team members. .055 Track progress. .056 Analyze results. .057 Describe the balance among quality, time, and money.	**Lessons:** • Wood sciences • Ceramics • Metals • Polymers • Composites	Quizzes on lessons **Projects:** TBD **Tooling U Tests:** 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 **Mid-Term Exam:** No exemptions

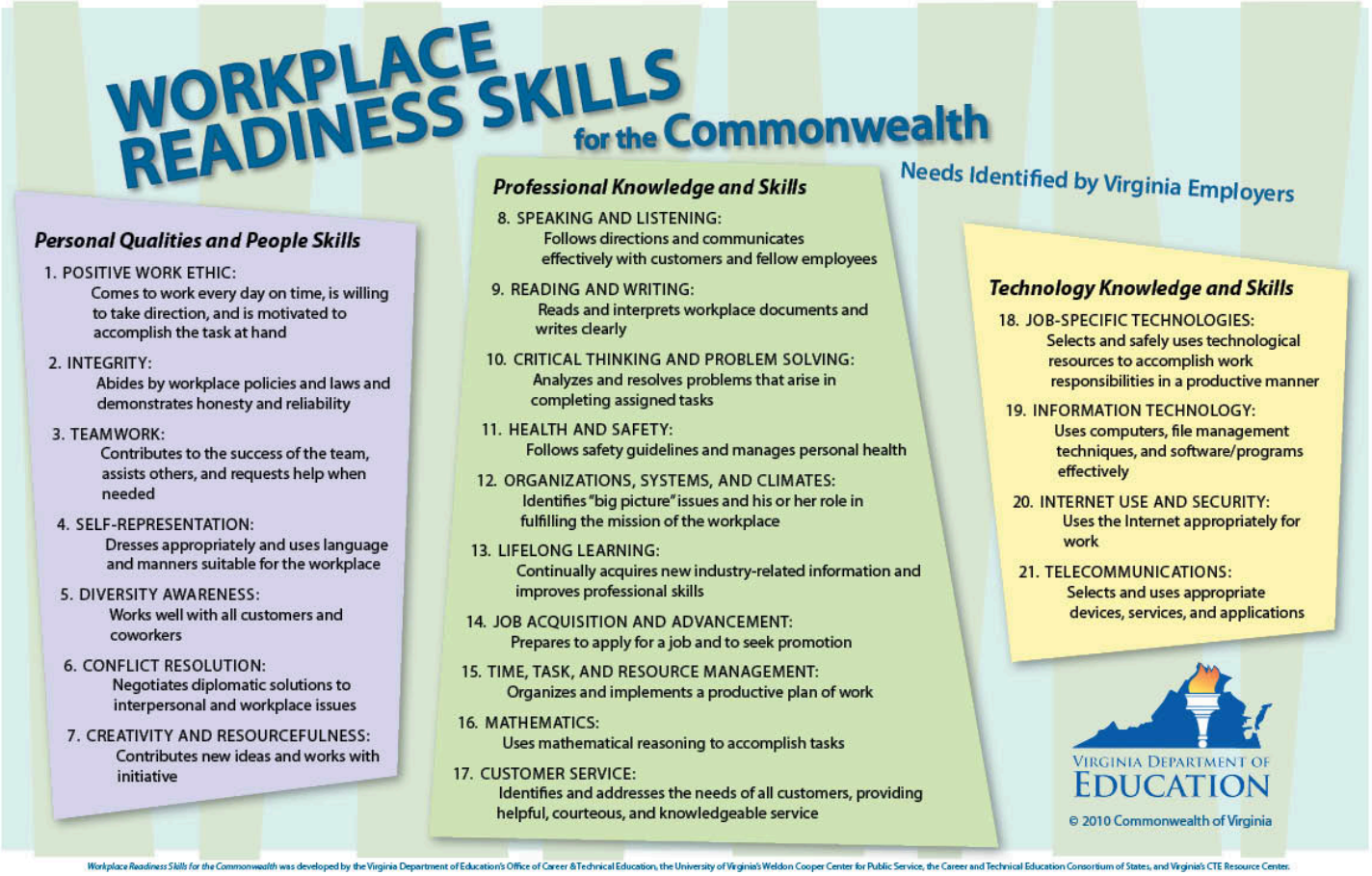
karen.beverly@bedford.k12.va.us

Applying Formal Engineering Communication Skills			
1/3 ~ 3/8	.058 Create a proposal for an engineering project. .059 Create a technical report on an engineering project. .060 Create a multimedia presentation of a finished proposal.	VEX Robotics - building and completing challenge	**Project:** TBD
Identifying Product and Process Trends and Exploring Engineering Ethics			
3/11 ~ 5/10 **Spring Break 4/15-4/19**	.061 Assess the economics of product and system life cycles. .062 Assess a new product or system currently entering the market. .063 Describe the factors necessary for changes in technology. .064 Define *forecasting*. .065 Research current technological trends. .066 Explain the objectives and importance of a feasibility study. .067 Compare professional and personal ethics. .068 Identify ethical theories. .069 Research a real-world case study.	Model Design and Testing Inventor Training - Basics Out-of-the-box problem-solving methods	Quiz on lessons **Activities:** Design and construct a reusable rocket system Drawing full sized parts - bridge design Apply and conquer problems in class given a set of specific criteria with grading rubric. **Projects:** TBD

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

karen.beverly@bedford.k12.va.us

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.