Bedford Public Schools

Grade 8 – Engineering

This course is designed to introduce students to engineering technology, develop problem-solving skills, and reinforce math skills. Through hands-on projects and student learning activities, students are introduced to technological systems within manufacturing, construction, transportation, and communication technology. Additionally, technical drawing skills are an integral part of this class. In the past, learning activities have focused on bridge design, computer simulations, model structures, prototype development, technical drawing, and CAD.

Learning Expectations

Manufacturing

Enduring Understandings In order to meet the standards, the students will need to understand that . . .	**Essential Questions** In order to understand, students will need to consider questions such as . . .	**Knowledge and Skills** Learning this material will require students to . . .
• Tools and machines extend human capabilities. • Design is an iterative process. • The engineering design process is used by engineers to solve technological problems. • Materials are selected for their properties and characteristics.	• How do you improve on a given design? • What makes a car design appealing to a consumer? • What makes a board game fun?	• Apply the engineering design process. • Describe basic manufacturing processes. • Read a 1/16 scale ruler. • Convert a fraction to a decimal. • Measure accurately to create technical drawings. **2013 NGSS Draft** • MS-ETS2-3. Analyze and compare properties of metals, plastics, wood, and ceramics, including stiffness, strength, ductility, hardness, thermal conductivity, electrical conductivity, and melting points. • MS-ETS2-6. Describe how a product can be created using basic processes in manufacturing systems, including forming, separating, conditioning, assembling, finishing, quality control, and safety.

Construction

Enduring Understandings In order to meet the standards, the students will need to understand that . . .	**Essential Questions** In order to understand, students will need to consider questions such as . . .	**Knowledge and Skills** Learning this material will require students to . . .
• Zoning laws regulate new development. • Structural systems work together to serve a structural function. • Structural engineers need to adhere to constraints when designing structures. • Zoning laws regulate new development.	• When building structures, should cities and towns allow variances to zoning laws? • What makes a structure aesthetically pleasing to a person?	• Apply the engineering design process. • Describe how structures impact people. • Create technical drawings to a desired scale. • Calculate square feet. **2013 NGSS Draft** • ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution. Include potential impacts on people and the natural environment that may limit possible solutions. • MS-ETS1-5. Create visual representations of solutions to a design problem. Accurately interpret and apply scale and proportion to visual representations.

Transportation

Enduring Understandings In order to meet the standards, the students will need to understand that . . .	**Essential Questions** In order to understand, students will need to consider questions such as . . .	**Knowledge and Skills** Learning this material will require students to . . .
• Transportation systems have positive and negative impacts on people, society, and the environment. • Transportation systems are created for land, air, water, and space.	• Should car companies be mandated by the US government to make rear view cameras standard equipment on all cars ?	• By the end of this unit of study, students should be able to, identify and describe subsystems of a transportation vehicle. **NGSS Draft** • MS-ETS3-3.Research and communicate information about how transportation systems are designed to move people and goods using a variety of vehicles and devices. Identify and describe subsystems of a transportation vehicle, including structural, propulsion, guidance, suspension, and control subsystems.

Communications

Enduring Understandings In order to meet the standards, the students will need to understand that . . .	**Essential Questions** In order to understand, students will need to consider questions such as . . .	**Knowledge and Skills** Learning this material will require students to . . .
• Communication includes having a message sent, received, and understood. • Communication systems are used to inform, persuade, educate, and entertain. • Communications systems have positive and negative impacts on people, society, and the environment.	• Why does the Lego Company use pictures instead of words in their instruction books for building products? • What communication system has a greater influence in shaping public opinion the internet, print, radio, or television?	• Explain the function of a communication system and the role of its components, including a source, encoder, transmitter, receiver, decoder, and storage. **NGSS Draft** • MS-ETS3-1.Explain the function of a communication system and the role of its components, including a source, encoder, transmitter, receiver, decoder, and storage. • MS-ETS3-2.Compare the benefits and drawbacks of four different communication systems rules.