**MINUTEMAN MIDDLE SCHOOL TECHNICAL LITERACY GRADE 8**

**The Department’s Educational Philosophy**

Minuteman Regional High School’s Middle School Program for Technical Literacy (previously called “Outreach”) dedicates itself to exposing students to the many different forms of engineering through a variety of hands-on projects and lessons. All lessons are built around the [**Massachusetts Science and Technology/Engineering Framework**](https://www.doe.mass.edu/frameworks/scitech/2016-04.pdf)

**Guiding Principles**

Expanding from the foundation set by Minuteman Tech 7 students will be exposed to the process involved with Construction, Transportation, Communication, Bio-Tech, Power and Energy Technologies. Safety and the Engineering Design Process will be used where students will design, build and test their solutions. Projects are more open-ended allowing students to come up with their own solutions being limited only by building materials and tools provided.

**Background to the Curriculum**

Students will translate an architectural floor plan into a scaled model house frame. Following strict estimating limits, students must calculate the materials necessary to complete the framing project.

**Core Topics/Questions/Concepts/Skills**

* Residential home construction, House framing, Construction technologies, Site planning, and prep, materials prep and estimating, A
* “Reacher Project” where students design and build their own grabbers
* Monster Truck Project is where students build a model Monster Truck with an electric motor and function al suspension system
* Speaker Project is a fun project where students make a simple dinner plate (Styrofoam/Paper) into a speaker.

**Course-End Learning Objectives**

***Students will:***

* Follow the Engineering Design Process, while learning to read architectural blueprints and design a housing frame around that design.
* Follow the process a similar house project would follow: plan, foundation, framing, flooring, door jams, window frames, hip roof plan. Students will use “Sketchup” software to design their homes and the Makerbot 3D printer to build their homes.
* Design and build a fully functioning speaker that will work with most sound systems. They will understand transmitter, receiver, and encoder as the primary role of a sound system.
* Study the field of Bio-Tech via the design, building, and testing of a “reacher.” This functioning assisted device must be able to lift common household items (i.e., remote, salt/pepper shakers, drinking glasses, etc.).
* Study Kn’ex Bridge design building. Teams of students will study tension, compression, torsion, and geometric construction shapes that will make a bridge strong enough to hold a minimum of 5lbs of a span of 3 feet.
* Translate an architectural floor plan into a scaled model house frame. Following strict estimating limits, students must calculate the materials necessary to complete the framing project.
* Be introduced to the materials used in residential house construction, from a concrete foundation, anchor bolts, and drainage to the plumbing, electrical and wooden house framing.
* Learn to read and understand an architectural floor plan, which will ultimately be the plan followed for their house construction.
* Estimate and calculate the amount of lumber (in board feet) needed to construct their house frame project.
* Following their house plan outline, students will follow a scaled design (while paying attention to strict building standards) and construct a house frame, complete with exterior and interior walls, door frames, and window frames.
* Students will use hand saws, band saws, hand sanders, Dremel tools, and wood glue to construct their models.

**Note**: We will use our three “MSET” testing machines, which will give real-time feedback on many of the above “physics” topics; i.e., tension, compression, friction, buoyancy, and impact.

**Grade 8 Standards Addressed**

***Technology/Engineering***

* Use informational text to illustrate that materials maintain their composition under various kinds of physical processing; however, some material properties may change if a process changes the particulate structure of a material.
* Present information that illustrates how a product can be created using basic processes in manufacturing systems, including forming, separating, conditioning, assembling, finishing, quality control, and safety. Compare the advantages and disadvantages of human vs. computer control of these processes.

**Assessment:**  As this is a “Pass/Fail” class, students will be expected to participate and follow all safety rules and classroom guidelines. Project completion will dictate any and all grading or participation measurement. There is a final test for the projects but sometimes different approaches are attempted with mixed results, as long as the experience shows effort and the individual has followed the steps in the Engineering Design Process the individual can still pass without completing the final test.