

Name of Course: STEM Guitar Building

Course Overview:			
The STEM Guitar Building course uses the construction of an electric guitar as a platform on which to teach a variety of STEM-related skills and knowledge. Over the course of the two trimesters, students will complete an electric guitar build of their very own, photo-journal the entire process, and complete a series of modular learning activities and assessments aligned with national standards in both science (NGSS) and mathematics (CCSS).			
Unit of Study	Essential Question(s)	Content/Skill	Instructional Strategies
1. The Rule of 18	Can the fret positions on a stringed instrument be calculated for all frets, given the scale length of the instrument?	Measurement Computation/Calculation Spreadsheets	Hands-On: Fret position marker layout and installation Academic: STEM Guitar MLA - <i>Spreadsheets for Fret Spacing</i>
2. The Vibrating String	Can tension, length, frequency and mass be calculated for a vibrating string?	Measurement Computation/Calculation Physics of Mechanical Waves	Hands-On: String-up, set-up and intonation of the completed instrument Academic: STEM Guitar MLA - <i>Scale Length, Frequency and String Tension</i>
3. Electric and Magnetic Fields	Can an electric current be induced by fluctuations in a nearby magnetic field, and vice-versa?	Measurement Computation/Calculation Physics of Electric and Magnetic Fields	Hands-On: "Tooth Tunes" Activity Academic: STEM Guitar MLA - <i>How Speakers Work</i>
4. Electric Guitar Control Circuit	Can a wiring schematic be drafted in order to achieve a particular audio signal effect, then implemented with real components.	Circuit Diagrams Soldering Electronics and Instrumentation	Hands-On: Soldering an electric guitar control circuit, Amp testing and trouble shooting a guitar control circuit Academic: STEM Guitar MLA - <i>Electronics</i>
5. The Setup	Can a prescribed process be followed in order to effectively set up a completed guitar to have comfortable playing action and be in tune across the fingerboard?	Measurement Computation/Calculation Electronics and Instrumentation	Hands-On: String-up, setup and intonation of the completed instrument Academic: STEM Guitar MLA - <i>The Setup</i>