

Grant Title: **Accelerated Pathways in Advanced Manufacturing (APAM)**

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Link: <http://www.ccri.edu/>

Document: Curriculum: STEM/STEAM Guitar Building

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Course Description:

STEM / STEAM Guitar Building

4 contact hrs per week (1 hr lecture, 3 hrs lab)

3 Credits.

Course #:

The National Science Foundation has embraced the art of guitar building as a 21st century way to provide a learning experience that crosses many academic disciplines involving the arts and the sciences. This course will introduce the student to the math and science behind the design and construction of an electric guitar and allow the student to build their own electric guitar in the process. Basic woodworking skills are desirable and the willingness to work hard and stay on schedule is a must. Students will be required to purchase and order the required guitar building materials through the Math Department at least 2-weeks prior to the class beginning date.



STEM GUITAR CLASS ROADMAP

This is an example course: This outline is designed to be flexible and changed to meet the needs of individual classrooms

Week	Material to be covered	Online activities	Assignments Due	Video Reviews
1	Guitar parts Overview, shop safety, guitar cost	Cost estimate, guitar anatomy activity	Guitar Kit price list and Online Anatomy quiz	
			Online Anatomy Quiz Link	
2	CAD tools for headstock design Select Bodies , start headstock design	Tolerances in Engineering activity	Guitar Video Review – Body sculpting Headstock design	<code><iframe height="315" src="http://www.youtube.com/embed/1gmqLbRAA8Y" frameborder="0" width="560" allowfullscreen=""></iframe></p></code>
			Online Tolerances Quiz Link	
3	Body modification, Finish headstock design	Guitar Geometry	Video File review – Wood repair Video File review – Swirl dipping from down under Guitar Body shapes - Research project	<code><iframe height="315" src="http://www.youtube.com/embed/gAxKsT2ejvw" frameborder="0" width="560" allowfullscreen=""></iframe><iframe height="315" src="http://www.youtube.com/embed/BVc6kdJF1PE" frameborder="0" width="560" allowfullscreen=""></iframe></code>
			Online Guitar Geometry Quiz Link	
4	Swirl painting chemistry – Importing Case Study Online CAD/CAM activity	Online CAD/CAM activity	Research paper - Case Study Video File review – Hole Drilling	<code><iframe height="315" src="http://www.youtube.com/embed/_KLrOfYpwyU" frameborder="0" width="560" allowfullscreen=""></iframe></code>
			Online CAD/CAM Activity Quiz Link	



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5	Neck assembly Neck fabrication Material Properties of Wood for Guitars activity	Material Properties of Wood for Guitars activity	Video File review – Neck Assembly Video 1, 2, 3	<pre><iframe width="560" height="315" src="http://www.youtube.com/e mbed/pVJ1LvmTlJk" frameborder="0" allowfullscreen=""></iframe> iframe width="560" height="315" src="http://www.youtube.com/e mbed/yV5hNQ6dY6w" frameborder="0" allowfullscreen=""></iframe> <iframe width="560" height="315" src="http://www.youtube.com/e mbed/oSmm-HINqi0" frameborder="0" allowfullscreen=""></iframe></pre>
			Online Material Properties of Wood for Guitars activity Quiz Link	
6	Neck fretting and math behind fret positions, Neck and Body finishes	Fret Spacing Calculation	Video File review – Neck Assembly Video 4 Video File review – Painting	<pre><iframe height="315" src="http://www.youtube.com/e mbed/GjXEZpofyuI" frameborder="0" width="560" allowfullscreen=""></iframe> <iframe width="1280" height="720" src="//www.youtube.com/embed/ oNh-DB-DF84" frameborder="0" allowfullscreen></iframe></pre>
			Online Fret Spacing Calculation Quiz Link	
7	midterm		Parts and Fretting locations	
8	Tuning and gear ratios		Tuning and gear Ratios activity	



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	Guitar setup activity – Bring in a guitar and strings			
9	Soldering and electronics	Online Electronics circuit path and pictorial activity	Video File review – Soldering	<code><iframe width="420" height="315" src="http://www.youtube.com/embed/POauOdF8vg8" frameborder="0" allowfullscreen=""></iframe></code>
			Online Electronics circuit path and pictorial activity Quiz Link	
10	Hardware Installation Threaded Fasteners activity	Threaded Fasteners activity	Video File review Hardware Installation	<code><iframe height="315" src="http://www.youtube.com/embed/Bp_RK6O45MQ" frameborder="0" width="560" allowfullscreen=""></iframe></code>
			Online Threaded Fasteners activity Quiz Link	
11	Hardware Installation Pickup assembly Scale Length, Frequency, & String Tension activity	Online Scale Length, Frequency, & String Tension activity	Video File review – Assembling Pickups SOUND CHECK BODY!	<code><iframe width="640" height="360" src="http://www.youtube.com/embed/0qBOHdUr64w" frameborder="0" allowfullscreen=""></iframe></code>
			Online Scale Length, Frequency, & String Tension activity Quiz Link	
12	Neck attachment Online Guitar Necks: The Compression and Tension of a Neck activity	Online Guitar Necks: The Compression and Tension of a Neck activity	Video File review – Buffing Guitars	<code><iframe width="1280" height="720" src="//www.youtube.com/embed/MTtTnOaw5xI" frameborder="0" allowfullscreen></iframe></code>



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			Online Guitar Necks: The Compression and Tension of a Neck activity Quiz Link	
13	Intonation basics	Intonation activity		
			Online Intonation activity Quiz Link	
14	Final assembly , Stings, String Nut Setup of Guitars	Setup activity		
			Online Setup activity Quiz Link	
15	Class Photo, final intonation		Final Setup	
16	Final guitar evaluation		Final guitar evaluation - Rubric	