

The guidelines for writing this proposal are that with the training received thru the Texas A&M RET program a lesson plan will be devised and inserted into the Principles of Engineering class at the Aldine Education Center. The class will be designed according to the TEKS (Texas Essential Knowledge and Skills) set forth by TEA (Texas Education Agency) obtained from the TEA website. The research done thru the RET program and the data gathered will be the foundation of the lesson plan. Students will study the manufacturing process of 3D printing and design their own part with the training in this class.

The first week students will do research and collect data to learn what 3D printing is and how it is used in manufacturing. The last day of the week there will be a class discussion on what 3D printing is and what is the process for printing a part. This information will be used to go into the second week where students will learn the Fusion 360 software.

In the second week the students will be introduced to Fusion 360. Fusion 360 is a CAD software that is free to students, so it can be loaded at home. There will be a lab in class the show students how to download the software, so they should have no problem loading it at home. After Fusion is loaded there will be a day of lecture about the software and to use it. There will be lab exercises on how to use Fusion and how to design simple parts, also students will have an assignment to design a simple part that will be turned in for a grade.

Week three will be when the students will be introduced to the measuring tools that will be needed to design the part later. Students will learn about most of the measuring tools out in the world, such as the measuring microscope, surface profilometer, optical profile projector and a few others. But the main tools we will study are the micrometer and the caliper, both tools will be used to get the measurements for the final project due at the end of the lesson. The first tool, the micrometer with flat ends is used for precise measurement of outside dimensions such as diameter, width, and length. The second tool we will use in the lab will be the caliper. The caliper is a measuring tool that will be used to take

measurements inside or outside an object. Students will be broken up in groups of 3 and with the largest class being 15, we will need 5 of both instruments. These instruments will be requested from the CTE department in the Aldine School District. There will be lab exercises that are designed to teach students how to use tools.

Week four will consist of the students learning about the 3D printers themselves. They will learn about the printers and how they work. They will learn about the different type of 3D printers, the materials used to print, what an STL file is and how to load to be printed. Also, students will learn about the different classifications of print such as the SLA (Stereo-lithography), FDM (Fused Deposition Modeling), EBM (Electron Beam Melting) and a few others. To make the lesson plan work there will need to be two 3D printers. The printer brand that will be used is the Ultimaker brand printer. This printer was chosen because of its functional prototyping and excellent component creation. These printer's will be requested from the CTE department at the Aldine Independent School District.

Week 5 and 6 will be spent with the students using the knowledge learned to design and create a project of there choice to print. They will use Fusion 360 to design the part, the measuring tools to get the correct measurement and the Ultimaker printer to print the part.

In summary with the knowledge learned thru the RET program at Texas A&M University this lesson plan is made possible. Before going the training, I had little to no knowledge of 3D printing, for that I thank you. Besides designing a lesson plan for the students, I will also open the printing training for any administrator or teacher interested in learning the class.