Course Title: Introduction to STEAM

Course #: 1505-1506

Course Description:
Students will engage in interdisciplinary learning of Science, Technology, Engineering, Art, and Math through a hands-on project based approach. The core of the class will be learning problem solving as design process. In doing so students will receive introductory level exploratory instruction on topics including proper use of machinery tools, foundation in applied physics, basic concepts of mechanical and electrical engineering, writing computer programs, designing and creating models using a Computer-Aided Design (CAD), and real-world applications of classroom concepts. Acquiring of knowledge will be demonstrated through a series of projects, starting with research and initial design and culminating with the completion of build projects that are geared toward solving real-world problems.

UC/CSU Approval: “g” approved

Grade Level: 9-12

Estimated Homework Per Week: 0 - 1 hr

Prerequisite: Concurrent enrollment in Algebra I or higher-level math

Recommended Prerequisite Skills: Good analytical skills and attention to detail.

Course Grade Scale:
- Homework: 15%
- Tests/Quizzes: 15%
- Projects: 50%
- Final Project: 20%

Major Assessments/Units/Topics:
Intro to STEAM is very project based. Students will make many projects as well as document the design process for each project in an Engineering Design Notebook. There will also be 4 - 6 quizzes per semester.

Unit 1: Introduction to STEAM
This is a quick unit introducing STEAM and STEAM careers. Students will research, make a presentation, and present to the class a STEAM career. Students will learn from their own presentation as well as others.

Unit 2: The Engineering Design Process
In this unit, students learn about the engineering design process and how to properly document their engineering designs as engineers do in the real-world for documenting patented designs.

- 2.1 Brainstorming: Students will do several exploratory and research activities on how to best brainstorm. Students will then do a project where they use their brainstorming skills to create an innovative design to successfully move ‘toxic waste’ from Cathedral to an un-named location (the ‘toxic waste’ is represented by blocks and it is moved from one table to another using paper, straws, tape, and McGyver skills).

- 2.2 Research: Students learn how to do research to help generate ideas and also to aid in their design. Students utilize their researching skills to help design and build a popsicle stick bridge. The highlight of the project is the competition day where weights are put on their popsicle stick bridges to see determine the strength of their bridge.

- 2.3 Design: Students learn about how to make a detail drawing to illustrate their design. Students also learn a 3D modeling program and how to design parts and assemblies in 3D. Finally, students are introduced to and learn about the tools in the shop. Students demonstrate their knowledge of these skills by building a wooden box. Most students initially think that this is an easy task, but are surprised to find out how difficult it can be.

- 2.4 Testing and Modification: Students will learn the importance of testing their projects and refining them to continually improve their designs. A quick paper airplane project will help them to practice this skill as they make different designs and modify their designs and track their results.

Semester 1 Final Project: Students will select a real-world problem and design a product to address the problem using the skills they have learned over the first semester. They will then make a commercial about their product. In this project, they will brainstorm, research, design, test, and modify their product.

Unit 3: Simple Machines and Newton’s Laws
Students will learn the 6 simple machines and Newton’s Laws. They will then apply this to make a car fueled by Newton’s Laws and taking advantage of simple machines. Students cars will compete to see which car travels the desired distances most accurately.

Unit 4: Electric Circuits
Students will learn what an electric circuit is and learn about the two types of circuits. Students will learn how to do calculations and how to make simple circuits. Students will utilize these skills by creating a scaled house or some other project which they will create a circuit to light up the project using Christmas lights.

Unit 5: Programming
Students will learn basic programming skills and demonstrate these skills with a project which varies from year to year.

Semester 2 Final Project: For the semester 2 final project, students will choose a project that demonstrates the skills they acquired during the year.