

# **E = MC<sup>2</sup>: EXCITE INTEREST IN ELECTRONICS THROUGH PROJECTS THAT MOTIVATE THE LEARNING OF CONCEPTS THROUGH CIRCUITS**

## **Abstract**

This workshop will actively engage the participants in the *concept-to-product* process which forms an integral part of electronic circuit design, assembly, test, and validation. Electronic circuit design requires knowledge of STEM concepts ranging from fundamental to advanced. The hands-on laboratory and project-based experiences are deemed to be among the most effective means to introduce and reinforce these concepts. In order to exploit the synergy between the K-12 STEM curriculum and the undergraduate engineering degree programs offered by academic institutions across the country, it behooves us to actively involve the K-12 educators in the engineering design process. In so doing, these educators have the opportunity to include new and/or revised STEM courses within their K-12 STEM curriculum which introduce the engineering design process and teach K-12 STEM students how to use engineering technology to solve engineering problems with design and cost constraints. These courses will incorporate project-based and goal-oriented STEM learning experiences to supplement the traditional STEM curriculum. The training offered by this workshop will consist of (a) overview and only the necessary detail of the STEM concepts that apply to electronic circuit design and analysis (b) application of these concepts to hands-on project-based laboratory activities. The participants will not be required to know advanced engineering design concepts. They will build the essential knowledge base from basic STEM principles and are expected to see and experience the link between the theory and practice of electronics. In this workshop, participants will work in teams of two. They will use the electronic components from the SNAP CIRCUITS PRO kit by Elenco. This is a kit that contains electrical components that can be easily placed onto their own circuit assembly boards. The components are placed onto the board using snap connectors, and are connected together to create basic and advanced circuits. These kits are very easy to use and assemble, and learning how to use them is very intuitive.

## **Goals of the Workshop**

The following are the primary goals or expected learning outcomes of this workshop.

- Understand the application of electrical engineering concepts through projects in electronic circuit design
- Assemble, test and validate simple and complex electronic circuits
- Gain vital hands-on laboratory experiences working as individual and on teams
- Learn ways to incorporate the workshop experiences and engineering content into K-12 STEM curricula

These goals are aligned with those of ASEE because they provide hands-on, best-practice activities for the attendees to nurture their skills, knowledge, and/or materials that they can use in their own teaching practice or scholarship of learning and teaching.