

ASSET STEM Education™ Professional Development

Course Syllabus – Fall 2018

Dr. Angela Hemingway and Dr. Kaitlin Maguire, STEM Action Center

Course Number: KE189TE2709

Course Hours: 15 total hours – 1 graduate level professional development credit

- A) Engineering Foundations & Rolling Things (SAE Engineering Module) K-3: 12 hours (2 days)
- B) Engineering Foundations & Gravity Cruiser (SAE Engineering Module) 4-6: 12 hours (2 days)
- C) Engineering Foundations & Glider Challenge (SAE Engineering Module) 6-8: 12 hours (2 days)

Link to Registration: <https://acecreek.boisestate.edu/wconnect/CourseStatus.awp?&course=KE189TE2709>

Deadline for Registration: May 1, 2018

Location and Course Dates: (12 hours)

- In Person Training:
 - Coeur d'Alene: April 16-17, 2018
 - Treasure Valley: April 19-20, 2018
- Independent Work: Implementing the module into classroom practice and providing feedback and reflection to ASSET STEM Education (3 hours virtual – this addresses Learner Outcomes number 5 and Course Assignment number 3.)
- Final Survey Due: November 15, 2018

Course Cost: \$60/credit

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COURSE DESCRIPTIONS: (All courses are 2 days and attendance is required to receive STEM materials)

A. Day 1: Engineering Foundations K-3: 6 hours (1 day)

Explore what it means to teach engineering intentionally in a classroom setting. This foundation is designed to help educators gain confidence as they teach engineering, develop an understanding of the structure and types of learning activities within each unit, employ the Engineering Design Process (EDP), and build an awareness of the engineering field. Participants will engage in a hands-on exploration as both a learner and educator, determine appropriate science content connections, and reflect on classroom implementation while developing their own conceptual understanding of engineering.

Day 2: Rolling Things (SAE Engineering Module): K-3: 6 hours (1 day)

Professional development will ready the educator to implement the *Rolling Things* unit with their students.

This unit challenges students to explore how changing the parameters of a ramp and vehicle will affect momentum and crash impact.

Concepts explored in this unit include gravity, potential and kinetic energy, friction, momentum, mass, velocity and acceleration. Participants will receive one teacher manual and one classroom module (to be shipped after completion of the course).

B. Day 1: Engineering Foundations 4-6: 6 hours (1 day)

Explore what it means to teach engineering intentionally in a classroom setting. This foundation is designed to help educators gain confidence as they teach engineering, develop an understanding of the structure and types of learning activities within each unit, employ the Engineering Design Process (EDP), and build an awareness of the engineering field. Participants will engage in a hands-on exploration as both a learner and educator,

determine appropriate science content connections, and reflect on classroom implementation while developing their own conceptual understanding of engineering.

Day 2: Gravity Cruiser (SAE Engineering Module) 4-6: 6 hours (1 day)

This unit challenges students to design and construct a vehicle that is powered by gravity.

Concepts explored in this unit include potential and kinetic energy, friction, inertia, momentum, diameter, circumference, measurement, graphing, and prototyping. Participants will receive one teacher manual and one classroom module (to be shipped after completion of the course).

C. Engineering Foundations & Glider Challenge (SAE Engineering Module) 6-8: 12 hours (2 days)

Explore what it means to teach engineering intentionally in the middle school setting, utilizing a cross-curriculum learning approach. Educators will receive a foundation for engaging students in the engineering design process *through* the hands-on professional development of A *World in Motion** unit: **Glider Challenge**.

In this unit, students explore the relationship between force and motion, aerodynamics, and the changing of variables that affect lift on a glider. While designing a toy glider for kids, students learn the relationships between data analysis and variable manipulations and the importance of understanding consumer demands.

Concepts explored in this module include physical science, consumer education, language arts, mathematics, and the arts. Participants will receive one teacher manual and one classroom module (to be shipped after completion of the course).

COURSE OBJECTIVES: Educators will attend the three-day professional development workshop to:

1. Understand and identify the benefits of engaging students in hands-on, minds-on activities
2. Investigate an engineering design process (EDP)
3. Explore the practices of science and engineering
4. Consider the inclusion of engineering design challenges to STEM education, including intentional teaching and design moves that promote students to engage in their learning in and outside of the classroom

LEARNER OUTCOMES:

1. Identify the benefits of engaging students in engineering design challenges
2. Recognize the roles of the teacher and the student in engineering design challenges and make appropriate changes to instructional practice and/or learning environment to support implementation.
3. Identify and communicate an understanding of science and engineering practices and their impact on student learning
4. Apply the science and engineering practices to teaching
5. Actively participate in a personal learning community focused on examining and changing educator practice.

COURSE ASSIGNMENT:

- 1) Attend the two-day professional development workshop in Lakeland or Boise.
- 2) Complete any and all surveys and assessments administered through the course and project.
- 3) Implement the engineering design challenge in the classroom
- 4) Complete final report by STEM AC.

FINAL SURVEY DUE DATE: November 15, 2018 by midnight MST via Salesforce – Community Grant Portal.

TRANSCRIPT FALL 2018