

TRACK 1 STEM ELECTIVE OPTIONS

This document is for Track 1 students only!!!

Have you ever considered a career as an inventor, scientist, architect or astronaut? The foundation of learning for these and other high-tech jobs of tomorrow begin with four letters - **S.T.E.M.** (Science, Technology, Engineering and Mathematics). As a member of the WCPSS STEM Schools Collaborative Network, we are excited about the many STEM learning opportunities that ECMS students will participate in for the 2016-17 academic year.

You have the opportunity to select and participate in a STEM elective this year! STEM electives are sessions that provide project-based, hands-on activities focused on STEM topics. These electives will occur once every three weeks and the ECMS staff will utilize their knowledge and talents to provide a great experience to all students. STEM Electives will be offered per track. You can only sign up for STEM Elective sessions for your track only (for scheduling purposes).

As you read the STEM elective options, please make note of the electives that interest you. Please be prepared to rank your elective choices in order of preference. We will try our best to assign you to one of your top preferences as space is available.

OPTION 1

Topic: Junk Box Wars

Instructors: A. Goforth & C. Watson

Location: Room 302

STEM Focus: Engineering



Learning Goals/Objectives:

Students will be challenged to use their imaginations, scientific knowledge, and a box of "junk" to create a variety of devices that perform an assortment of tasks.

Essential/Driving Question(s):

1. What is the engineering design process and how is it used?
2. Why is brainstorming important when modifying or improving a product?
3. Why is teamwork important when modifying or improving a product?
4. Why is a design process so important to follow when creating a solution to a problem?

Description:

Students will develop their engineering design skills, learn to work collaboratively, and learn to overcome obstacles to solve problems. Each class will involve a new design problem and students will be presenting their final projects at the end of each elective day.

OPTION 2

Topic: "Whodunnit?" - Forensic Science"

Instructors: L. Haynie & V. Fernandez

Location: Room 802

STEM Focus: Science, Technology



Learning Goals/Objectives: Students will use science process skills (inferring, observing, communicating, hypothesizing, measuring, collaborating) and the scientific method to gain knowledge about how forensic scientists and other related careers solve real-life crimes.

Essential/Driving Question(s): How do forensic analysts and law enforcement professionals use science and technology to solve mysteries?

Description: Forensic science is the scientific method of gathering and examining information about the past. This is especially important in law enforcement where forensics is done in relation to criminal and civil law. Forensics is also used in other fields such as astronomy, archaeology, biology, and geology to investigate ancient times. Students in this STEM elective will be exposed to the science process skills needed to investigate real-world crimes and mysteries and will have the opportunity to have guest speakers from the Durham Police Department and a Fire Protection Instructor from Johnston Community College. Students may also have the opportunity to visit the State Bureau of Investigation as an after-school enrichment activity.

OPTION 3

Topic: Physic in Sports

Instructors: M. Hayes & C. Miller

Location: Science, Engineering, Math

STEM Focus: Room 806



Learning Goals/Objectives:

7.P.1.1 Explain how the motion of an object can be described by its position, direction of motion, and speed with respect to some other object.

7.P.1.2 Explain the effects of balanced and unbalanced forces acting on an object (including friction, gravity and magnets).

7.P.1.3 Illustrate the motion of an object using a graph to show a change in position over a period of time.

7.P.1.4 Interpret distance versus time graphs for constant speed and variable motion.

Essential/Driving Question(s):

What effect do angle, force, and friction have on various sports equipment?

Description:

Students will learn basic statistics, how to measure accurately, finding an angle in real life, and the use of GPS equipment on their phones. Students will create a sports invention to better the sport of their choice. We will be making a mock kickstarter page to raise virtual funds for their inventions.

OPTION 4:

Topic: Farm to Table: STEM in Agribusiness

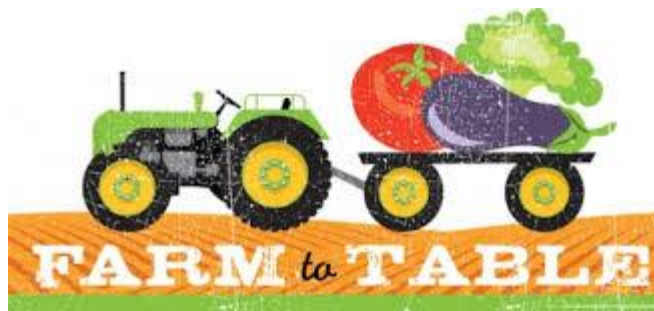
Instructors: M. Gilliland & M. St. Louis

Location: Room 803

STEM Focus: Science, Technology, Engineering, Mathematics

Learning Goals/Objectives:

In this course, students will learn about how each component of STEM relates to the business of agriculture, from the engineering involved in the science of growing crops to the mathematics and technology involved in the business operations of selling crops through markets, online produce boxes, and farm-to-table models.



Essential/Driving Question(s):

- What is agribusiness?
- What technologies are important in 21st century agriculture?
- How do modern agribusinesses market and sell their products?
- What is a business plan?
- How can we develop a profitable agribusiness model?

Description:

Students will learn about technologies and engineering methods involved in growing crops in the 21st century.

- Students will learn about different business models used in marketing and selling agricultural products.
- Students will develop their own agricultural business plan.
- Students will learn about new agricultural technologies and engineering processes.
- Students will learn about the processes involved in marketing commercial products.
- Students will learn how to create a business plan.
- Students will develop collaboration and communication skills.

OPTION 5:

Topic: Bridge Building

Instructors: Sebastian Greene

Location: 208

STEM Focus: Engineering, Mathematics

Learning Goals/Objectives:

Students will design and test popsicle bridges to see how much of a load their bridge can handle before breaking.



Essential/Driving Question(s):

What are the more effective designs to use when building a bridge?
How are different designs more effective in different situations?

What is an effective load to weight ratio?

Description:

Design and construction of a bridge. Learn the basics of a bridge and the shapes that are used to create the structure. Calculate load vs. weight ratio. Use the engineering process to reflect on initial design and increase the effectiveness after reflecting on the results of testing the bridge.

OPTION 6:

Topic: Underwriter's Lab Engineering & Technology

Instructors: Keith Gouge/Sahar El Shafie

Location: 313

STEM Focus: Engineering

Learning Goals/Objectives:

- Students will learn various ways UL sets standards for different products they support.
- Students will learn expectations of UL employees.
- Students will learn brand integrity of products.



Essential/Driving Question(s):

What standards does UL set for different products?

What are the expectations of employees at UL?

What is brand integrity and how does this relate to UL?

Description:

This STEM elective will provide students with knowledge of various ways engineering can be utilized in real world situations. Students will have an opportunity to connect to the future job world by interacting with industry professionals. They will participate in group activities allowing them to develop collaboration skills and higher level thinking/problem solving skills!

OPTION 7:

Topic: STEM in Gardening

Instructors: Joseph Duprey & Teikeisha Beddoe

Location: 301

STEM Focus: Science, Technology, & Engineering

Learning Goals/Objectives:

Students will be able to:

- take measurements and create a garden plan/map;
- build a simple garden bed

Essential/Driving Question(s):

Description:



Students will have an opportunity to develop a wide variety of STEM skills through this STEM elective. To develop **science** skills, they will plants and insects, learn nutrition skills, observe the effects of weather, and learn about more advanced science topics. To develop knowledge of **technology** used for gardening, they will discuss machines and technology used in larger gardens or in farming. To develop **engineering** skills, they will develop the best use of seeds and fertilizer for our working space and come up with a plan (blueprint) for a space that of their choosing, as well as planning what will be grown in the space. To develop **math** skills, they will problem solve to figure out how much of what they plant and grow that they would have to sell to make a profit.

OPTION 8:

Topic : Girls in Engineering

Instructors : L. Rackley & C. Bullock

Location : Room 513

STEM Focus: Science, Technology, Engineering, & Mathematics

Description:

This elective gives girls an opportunity to work collaboratively on a project that will help them learn about engineering and how this profession contributes to solving problems significant to society. Students will sharpen their researching skills by accessing research digitally. They will also have an opportunity to improve their planning skills (project planning, considering which HS courses to take before college to prepare for future engineering career). By the end of this elective, they will engineer a backpack that is functional in form but made entirely of duct tape.



Learning Goals/Objectives:

- Students will understand what engineering is and how it impacts society.
- Students will learn about the different branches of engineering: chemical, civil, electrical, and mechanical.
- Students will be aware of the many college options within this field of study.

Essential/Driving Question(s):

What impact does engineering have on product design and commerce?
How does simple and complex engineering help society function?
How does math play a part in engineering and design?

OPTION 9:

Topic:

Instructors: Kimberly Cole-Brown & Lisa Smith

Location: 501

STEM Focus: Art & Fashion

Learning Goals/Objectives:

Students will understand and relate science and technology as a driving factor behind art and fashion production.



Essential/Driving Question(s):

How has technology influenced the fashion industry?
How has technology influenced art and art production?
How does science drive production of art and fashion?

Description:

Students will develop a deeper understanding of the ways science and technology are relevant in our daily lives, specifically through art and fashion. Students will use technology to design their own products.

OPTION 10:

Topic: Sports Performance

Instructors: John Regan

Location: 210

STEM Focus:

Learning Goals/Objectives:

Students will:

- learn the major bones, muscles, muscle movements, tendons, and energy systems in the human body.
- learn how these body parts work cohesively in a sport environment.
- learn the basic principals of sport performance programing.
- use this knowledge to create a basic training plan for an athlete of their choosing

**Essential/Driving Question(s):**

- How does the body react in sport specific situations/environments?
- Why does the body act this way?
- And how can we, through the implementations of basic sport performance principles, improve the body's reaction to these sport specific situations/environments.

Description:

This STEM elective relates to Science by giving students an in-depth look into how the bones, muscles, tendons, and energy systems all relate together during sport-specific movements. Students will learn about the human body. They will learn about how the human body reacts during sport specific situations and how to the train the human body for those situations.