



T.C. Williams High School

STEM EXPLORATIONS

Mrs. Kelly Mayer

Room 207

I am available during lunch and after school by appointment.

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Syllabus

Course Description:

This experiential course immerses students in the investigation of real-world engineering and technology problems and decisions affecting their local, state, national and global communities. The course encourages students to use the habits of mind employed by actual scientists, engineers, technology specialists and mathematicians. Students work in teams to identify a problem relevant to life in Alexandria and consistent with identified course themes. Each problem-solution, investigation and decision-making scenario makes use of a design cycle protocol and is conducted using a combination of laboratory and field experiences. Students' physical work space allows them to access support to gain hands-on experiences with a range of technologies and innovative processes related to designing and building projects. Partners with local STEM businesses and organizations bring industry experts into the classroom for collaboration in problem solving.

Course Essential Questions:

Unit 1: How do our choices have enduring consequences for our local, state, national, and global communities?

Unit 2: How do environments affect local, state, national and global economic systems (and vice versa)?

Unit 3: What is the human cost of society's advancements?

Unit 4: What impacts do innovations have on civilizations?

Unit 5: How can our knowledge and skills be used to build sustainable communities?

Course Transfer Goals:

- Students will be able apply the problem-solving process to local, state, national and global STEM problems. These skills include:
 - Define the problem, identify stakeholders
 - Research, identify and analyze the problem and constraints
 - Identify possible solutions and approaches
 - Creating models and prototypes
 - Presenting and implementing an action plan

- Reflecting on the success of the solutions
- Students will be able to identify and analyze the consequences of the choices a community makes through research and present findings using various technologies and media sources.

Course At A Glance:

Unit 1: Introduction to Sustainability and the STEM Problem Solving Process
Students will be introduced to the various sub-themes of sustainability through an examination of current local, state, national and global issues, while developing the technology skills that will make them better digital learners for the remainder of the year. Students will explore how current practices can have consequences for future generations and how the problem-solving process can be used to address possible consequences.
Unit 2: Environment and Economic Costs
Students will identify and analyze themselves in local, state, national, and global issues and problems involving the environment, as well as the economic costs associated with the issues and problems. Connections between the economy and the environment will be examined, and how economic systems are dependent on a civilization’s environment. Students will look at how environments change through current issues, such as climate change.
Unit 3: Infrastructure and Social Justice
Students will be able to analyze the relationship between infrastructure and social justice in a community. Relationships between class systems and infrastructure will be examined to see how physical space and organization affect social interactions. Students will use maps and artifacts to identify aspects of urban design. They will identify obstacles and constraints in a community, such as public transportation, in order to develop a plan for a more sustainable one.
Unit 4: Innovative Technology
Students will identify, analyze, and solve local, state, national and global issues in regards to innovative technology and the resource cost of those technologies. They will examine how innovation can have unintended consequences for individuals and the communities that they are a part of. Students will begin by looking at historical technologies and move towards more recent innovative technologies. They will look at possible ethical constraints or restrictions of such technologies.
Unit 5: Reflections – Looking to the Future
Students will reflect on what they have learned throughout their year in STEM Explorations. They will analyze and evaluate the skills and knowledge they have developed to create personal and community goals.

The Materials:

- Loose leaf notebook paper
- Pens or pencils
- A binder or folder to store paper

Supports Available:

- Before and after school tutoring
- Writing Center at the King Street Campus
- After school support by appointment

Grading Criteria:

- Summative Assessment: 60%
- Formative Assessment: 40%

Class Specific Assessment Grading Policy:

- Excused Absence – Student will have the same number of days absent to make up the work with no late penalty.
- Late Work – Work turned in beyond the due date will be assessed a 15% penalty. After two class periods, late work beyond two days absent will be accepted for 50% credit.

NOTE: All policies listed in the “Common Course Expectations” document posted on Canvas, including the ACPS Honor Code (<https://www.acps.k12.va.us/cms/lib/VA01918616/Centricity/Shared/documents/school-board-policies/jfc-r2.pdf>), apply to all classes at T.C. Williams High School.