



## **T.C. Williams High School**

### **Engineering Explorations I**

**Mr. Brian Wright**

**Room 209**

#### **Best Time to Reach Me:**

**Monday – Friday: 7:45-8:20 am**

#### **Office hours:**

**Monday-Friday: 7:45-8:15 am**

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## **Syllabus**

### **Course Description:**

- While undergoing an orientation to the careers and challenges of engineering, students are actively involved with high-tech devices, engineering graphics, and mathematical concepts and scientific principles through problem-solving experiences. Activities in descriptive geometry, materials science, and technical systems challenge students as they communicate information through seminars, technical reports, and idea sharing.
- Students will work actively in groups and independently to learn about the history of engineering as well as the education necessary to become a successful engineer. Students will take field trips and hear from several guest speakers to aid in their learning

### **Course Essential Questions:**

- Is technological change, progress?
- How are all learners capable of becoming successful engineers?
- To what extent are engineers capable of creating change?

### **Course Transfer Goals:**

- Students will identify benefits of studying the humanities and social sciences by researching the historical implications of engineering.
- Students will describe the principle fields of engineering and identify the education and characteristics needed in these fields.
- Students will use mathematical and creative skills to improve engineering designs and processes.

## Course At A Glance:

\*(times are approximates)

Quarter One	Quarter Two	Quarter Three	Quarter Four
<p><b>Unit 1: What Does It Take To Be An Engineer?: History of Engineering &amp; Careers</b> (5 Weeks)</p> <p>In this unit, students will investigate the contributions of engineering in history, STEM principles and how they relate. Students will identify the many types of engineering and the requirements needed to become an engineer and related careers. They will examine all aspects of industry and technological systems.</p>	<p><b>Unit 3: America's Next Top Models: Sketching, Dimensioning, and Designing for Production</b> (8 Weeks)</p> <p>In this unit, students will gain an understanding modeling. They will learn to draft using drafting tools and different viewpoints. They will project orthographic and isometric view. Students will utilize proper scaling for real objects. Students will draw objects with a CAD program to scale and create a three-dimensional model of an object.</p>	<p><b>Unit 4: You, Me and Robots : Automation and Robotics</b> (6 Weeks)</p> <p>In this unit, students will gain an understanding of robotics by identifying the many uses of robots. Students will be able to program a Lego NXT robot by working in teams to make the robot navigate through a maze.</p>	<p><b>Unit 6: The Journey of Flight: Flight and Space</b> (4 Weeks)</p> <p>In this unit, students will review the history of aviation and identify the many historical moments and people in aviation history. Students will gain an understanding of the parts and functions of an airplane and demonstrate their understanding the future of space flight. Students will investigate aerospace engineering.</p>
<p><b>Unit 2: The Challenge of Design: Engineering Design Process</b> (4 Weeks)</p> <p>In this unit, students will evaluate the engineering design process and use it to solve technical real world problems. They will learn content of different engineers, then design and build structures/components to solve problems.</p>		<p><b>Unit 5: Will It Last? Sustainability and Green Energy</b> (4 Weeks)</p> <p>In this unit, the student will review sustainability concepts through the lenses of environmental engineering and green energy manufacturing. Students will analyze their carbon footprint and formulate solutions to some pollution problems.</p>	<p><b>Unit 7: Putting It All Together: Research and Design</b> (4 Weeks)</p> <p>Students will use concepts throughout the course to explore the field of research and design. Through a short design paper and project, students will demonstrate their understanding of this engineering field.</p>
<p><b>Example Projects</b></p> <p>Engineering Career Movie: Students will create a movie demonstrating the many fields of engineering one can study with industry information.</p> <p>Bridge Design: Students will research different types of bridges and create a popsicle stick bridge that will be tested for weight and strength.</p> <p>3-D Model Printing: Students will create models using a 3-D printer to solve a design problem.</p> <p>Balsawood Gliders: Students will create working gliders with balsawood</p> <p>Moon Mission Design: In this unit, students will work in groups to create a final mission to the Moon. Students will use concepts from previous missions, mainly Gemini, Mercury, and Apollo missions.</p>			
<p><b>Overarching Units (Integrated Throughout Every Unit)</b></p> <p><b>Workplace Readiness Skills:</b> Integrated throughout the units, students will maintain and model positive, professional work ethics; participate effectively in teamwork and leadership roles; demonstrate speaking and listening skills, reading and writing skills, critical thinking and problem solving skills, personal qualities, people skills, and professional and technology knowledge and skills.</p> <p><b>Ethics in Technology:</b> Integrated throughout the units, students will investigate the morals, ethics and values that should be considered when applying technology.</p>			

**Every Titan Succeeds**

**Materials:**

- Pencils or Pens
- Bound Quad Ruled/Graph Composition Book
- Loose-Leaf Paper
- Folder
- Glue Stick
- 1 Subject Notebook (School Issued)
- Calculator/Chromebook (School Issued)

**Supports Available:** (Students are expected to use these supports to enhance academic achievement)

- Math Center
- Writing Center
- Saturday Learning Academy
- Before School Tutoring with Teacher
- Khan Academy

**Grading Criteria:**

Components of Class	%
Unit Projects/ Tests/Quizzes	50
Class/Homework (Includes bell ringers, exit passes, instant challenges, participation)	35
Quarter Portfolios (Including interactive notebooks)	15

**Homework and Testing Policy for Absentees**

- A student with an excused absence is to come before or after class to receive missing work and is given one extra day for every day they were absent to complete the missing work. It is the student's responsibility to ask for and turn in missing assignments.
- A student who has an excused absence during a test or quiz is expected to make up the test or quiz the day they return. A student who was absent the class before the test is still expected to take the test/quiz if notified prior to their absence.

**Grading Policy for Late Assignments**

- An assignment is due and should be turned in when I call for the assignment. Students will have until I grade and pass back the assignment to turn in the assignment and can only receive a maximum of 85% credit for the assignment.

**Classroom Rules**

- Safety first
- Respect everyone and everything in the class
- Keep the classroom/your area clean
- Take responsibility for your actions

**NOTE: All policies listed in the "Common Course Expectations" including, the ACPS Honor Code apply to all classes at T.C. Williams High School.**