

TARC Rocket Camp Syllabus and Guidelines

Summary

Future Rocketeers Camp is an opportunity for inspired middle and high school students to develop their knowledge of real-world aerospace mechanics with lessons on fundamental yet universally applicable physics laws in an open and fun environment. Lessons at camp will move rather quickly, with the main goal of introducing students to our covered topics and spreading interest in rocketry and the aerospace field. Our goal is to provide a fun learning environment where questions are encouraged and hands-on learning is center stage. The camp will culminate in a final day where we welcome a guest speaker and recap on topics learned with an exciting game of Physics Jeopardy.

Topics Covered

- Introduction to Kinematics and Motion
- Introduction to Energy, Impulse, and Momentum
- Introduction to Aerodynamics and Airflow

Mission

The mission of the camp is to introduce students to fundamentals without deep-diving into the mathematics and calculus that surrounds aerodynamics. We want to excite students about physics, and about the real life applications of it in both model rocketry and the field of aerospace engineering.

Dates

This is the main body of the camp, August 10th through 14th, and it assumes social distancing will continue through August.

During the class, people can ask questions, and depending on whether we will cover it later, we will answer, and students will receive up to 30 minutes of optional enrichment work per day.

Schedule

- Physics Part 1: (August 10-12)
 - Basic kinematics and linear motion

- Basic kinematic forces (gravity), we will use the “ramp problem” to provide examples of friction
 - Energy and Impulse, Momentum
- Physics Part 2: (August 13)
 - Aerodynamics
 - We will focus on thrust, friction, an introduction to fluid dynamics (no math, mainly conceptual (for example laminar/turbulent flow, flow boundaries), stability, center of gravity and pressure, and various other factors that impact rocket performance
 - For example how different nose cones differently affect drag
 - For example, we will explain concepts such as vector addition (utilizing wind and thrust) to identify the angle at which a rocket would “theoretically” fly if hit by a certain crosswind
- Final class – advances in Aerospace and unique ideas of how these concepts are used: (August 14)
 - Physics Jeopardy (cover what we learned) (1 hour)
 - Additionally, we will bring in a current Aerospace PhD student/professor/industry professional to talk about their work in the field (1 hour)

Target Audience

The main body of students our camp is working to teach is primarily middle school students and some high school students. As this is more of a camp teaching the basics, more advanced students will likely already know the content, so we are focusing on younger children as the main target audience.