



## Summer 2022 Workshop Agenda: New Mexico

### **Outcomes: Participants will be able to...**

- assemble an Arduino microcontroller and sensors.
  - program an Arduino and collect data from the sensors.
  - assemble a CubeSat frame with an Arduino microcontroller.
  - integrate CubeSats onto a balloon launch platform.
  - launch, communicate with, and recover a balloon mission.
  - communicate with CubeSats on suborbital and orbital missions.
  - collect, present, and disseminate data collected from CubeSat missions.
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**6/26 - Sun - Meet & Greet - D.H. Lescombes 5:00 pm**

### **6/27 - Mon - Microcontrollers & Sensors**

Breakfast	8:30 am
TIS & Partner Introductions	9:00 am
Intro to Working with Arduino	9:15 am
• Arduino IDE	15 min.
• Arduino Board Parts	15 min.
• Breadboard & Connections	15 min.
Arduino Programming Language	10:00 am
• LED Wiring & Programming	15 min.
• Arduino Libraries & where to find them	15 min.
Sensor Install & Programming	10:30 am
• Photosensor	15 min.
• Soldering Components	60 min.

Dr. Barbie Buckner, Education Specialist for NASA EPDC	11:45 am
• Building a Satellite Classroom Activity	45 min.
Lunch	12:30 pm
Dr. Barbie Buckner, Education Specialist for NASA EPDC	1:30 pm
• Building a Satellite Classroom Activity (Cont.)	45 min.
Speaker - Katie Westley & Alice Caruth	2:15 pm
Sensor Install & Programming	3:15 pm
• Temperature	30 min.
Onsite Experience - Challenger Center Mission	3:45 pm
Wrap-up	4:45 - 5:15 pm

### **6/28 - Tue - Arduino & CubeSats**

Breakfast	8:30 am
Sensor Install, Programming, & Soldering	9:00 am
• SD Storage Expansion	15 min.
• Real-time Clock	60 min.
• UV Sensor	15 min.
• Air Quality Sensor	45 min.
• Gyroscope/Accelerometer	30 min.
Dr. Barbie Buckner, Education Specialist for NASA EPDC	11:45 am
• Launching a Satellite Classroom Activity	45 min.
Lunch	12:30 pm
Dr. Barbie Buckner, Education Specialist for NASA EPDC	1:30 pm
• Launching a Satellite Classroom Activity (Cont.)	45 min.
Sensor Install, Programming & Soldering	2:15 pm
• Heart Rate Monitor	45 min.
• Cube Frame Build	60 min.
Firefly Aerospace - STEM Academy (Virtual)	4:00 pm
Wrap-up	5:00 pm

### **6/29 - Wed - Glider Flights/CubeSat Integration**

Breakfast	TBD
• Glider Flights	TBD
Lunch	TBD
Arduino & Sensors Wrap-up	1:30 pm
Data Analysis	2:00 pm
• Retrieving Data	15 min.

● Data Formats	15 min.
● Making Sense of Data	15 min.
● Creating Visual Representations	15 min.
Experimental Development in the Classroom	3:00 pm
● CubeSats in the classroom brainstorm	30 min.
Integrating CubeSats onto Balloon Launches	4:00 pm
● Planning	15 min.
● Payload	15 min.
● Launch	15 min.
● Tracking & Recovery	15 min.
Wrap-up	5:00 pm

### **6/30 - Thu - Balloon Mission/Spaceport America Visit**

Balloon Mission	TBD
Lunch	TBD
Virgin Galactic Tour @ Spaceport America	1:00 pm

### **7/1 - Fri - Balloon Data/Satellite Communications**

Breakfast	8:30 am
Licensing Orbital Satellites	9:00 am
Satellite Communications	9:15 am
● Basic Radio Communications	30 min.
● APRS & Ground Stations	15 min.
● Celestial Mechanics	20 min.
● Satellite ID & Tracking	20 min.
● Factors Affecting Communication	20 min.
● Building a Simple Ground Receiver	60 min.
Lunch	12:00 pm
Hasshi Sudler - Villanova University	1:00 pm
● Blockchain in Space	60 min.
Satellite Communications	2:00 pm
● Communicating with ISS	10 min.
● Serenity Satellite	30 min.
● Working with Data from Satellites	20 min.
Balloon Mission Data	3:00 pm
Commercial Space Stations & Orbital Debris Discussion	4:00 pm
Q&A/Post Surveys/Wrap Up	4:30 pm