Drones 7-9 Syllabus

Course Goals

1 Getting Ready to Fly
Students learn the basic physics of flight and are introduced to the components of unmanned aircraft systems (UAS). Students also study the current regulations governing drone use and the various degrees of airspace restriction.

2 Flying
Students pilot a drone from the ground, practicing various maneuvers to perform an assortment of tasks.

3 Teamwork and Problem-Solving
Students work together to complete an engineering challenge incorporating both controlled and autonomous flight.

4 Programming
Students use the DroneBlocks interface as well as Arduino software to program drone flight paths and gather information about the environment.

Course Topics

1 Science of Flight
Students learn how aircraft fly and the vocabulary for discussing various aircraft systems.

2 Drone Safety
Students learn procedures for safe drone operation in a classroom setting, as well as the regulations governing drone use more broadly.

3 Drone Piloting
Students fly several configurations and models of drones, honing their skills by performing a variety of tasks.

4 Visual Observer Training
Students practice using FAA guidelines to help support UAS pilots from the ground.

5 Search and Rescue
Students work together to aerially seek out and retrieve items of interest.

6 Photography & Videography
Students use drones' onboard cameras to take photos and create aerial video projects.

7 Autonomous Flight
Students use the DroneBlocks app to code flight paths for the drones to follow without further human input.

8 Sensors / Electronics
Students attach components to sense environmental data and report back findings to a receiver on the ground.

Course Schedule

Day 1
Course Introduction
Students are introduced to the instructor and the rules of the class.

What Is a Drone?
Students learn about basic principles of physics related to flight, and are introduced to the different components of a small Unmanned Aircraft System (sUAS).

Flight Demo
The instructor demonstrates safe operation of a micro-drone indoors.

Hello, Tello!
Students are introduced to the drone models we will be using in class, and the various ways in which they will be controlled.

Drone Selfies
Students use their drones' on-board cameras to take self portraits from a new point of view.

Day 2
Take It Outside: Understanding Airspace
Students learn about the different classes of restricted airspace, and how to determine where they are allowed to fly.

Look, Up in the Sky: Visual Observer Training
Students learn FAA guidelines to act as a visual observer assisting a drone pilot from the ground.

Meet the Phantom
Students learn to pilot a larger drone outdoors and soar to new heights.

Drone On Your Own - Maneuvers Checklist
Students fly on their own for the first time, practicing carrying out a series of different maneuvers.

Day 3
Drone Search and Rescue
Students work together as a search team to locate a toy "victim" and air-lift them to safety.

Short-Order Drones
Students compete to complete a string of restaurant-style delivery orders via drone.

Day 4
Video Pre-Production
Students watch some examples of film scenes shot with drones, then brainstorm a class video project of their own.

Video Production
Students assume different roles on a film set to bring their vision to life.

Video Post-Production
Students review and edit their footage on a computer to create a finished film.

Day 5

Scavenger Drones
Students use their drones to look for a list of items, taking pictures as they find each one.

Hide and Drone Seek
Students take turns finding hidden classmates via drone.

Day 6

Introduction to Droneblocks
Students use a simple block-based programming interface to code drone flight-paths wirelessly from their computers.

Pseudo-Swarms
Students program a group of drones to fly in formation and create geometric figures.

Day 7

Introducing the ROAVcopter Challenge
Students are introduced to our final project: A multi-stage competition requiring remote flight, autonomous flight, and data collection using drone-mounted sensors.

Building Obstacle Course
Students construct an obstacle course for their drones to fly through.

Day 8

Autonomous Flight Programming
Students measure their course and create a program to navigate through it autonomously.

The ROAV Sensor System
Students mount the ROAV sensor system to their drone and use it to gather and interpret atmospheric data.

Day 9

ROAVcopter Challenge
Students demonstrate everything they have learned by competing in the multi-stage ROAVcopter challenge.

Day 10

Drone On and On: The Future of Unmanned Aircraft
Students discuss what they have learned in class and what the future may hold as drone technology develops.

Drone Picture Day
Students use the Phantom to take a final class photo.

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