About this Curriculum

All about the Tello Drone
-- Tello
– Tello EDU
– RoboMaster TT

Unit 1: Safety First

Unit 1 Vocabulary
Unit 1 Concepts
Unit 1 Performance Objectives
1.1 – Safety First
1.2 – Your Safety Responsibility
1.3 – Establishing a Safety Culture
1.4 – Workshop Safety Issues
1.5 – Workshop Safety Rules
1.6 – Soldering Safety Rules
1.7 – Educational Regulations
1.8 – Drone Registration
1.9 – Definition of Recreational Use
1.10 – Rules for Recreational Flyers
1.11 – Privacy Policy
1.12 – Safe Flying Locations
1.13 – No-Fly Zones
1.14 – Safe Weather Conditions
1.15 – Safe Flight Clearance
1.16 – Visual Line of Sight
1.17 – Start Out Slowly
1.18 – Propeller Dangers
1.19 – Pre-Flight Inspection
Unit 1 Summary

Unit 2: Overview of Drone Design

Unit 2 Vocabulary
Unit 2 Concepts
Unit 2 Performance Objectives
2.1 – What is a Drone?
2.2 – Drones Are Used for Other Purposes
2.3 – Brief History of Aerial Drones
2.4 – Drone Reputation
2.5 – Development of Small UAVs
2.6 – What's in a Name?
2.7 – Types of Small UAVs (sUAV)
2.8 – Choosing a Multicopter Configurations
2.9 – Drone Components
2.10 - Current Uses and Future Potential
Unit 2 Summary

Unit 3: Basics of Flight

Unit 3 Vocabulary
Unit 3 Concepts
Unit 3 Performance Objectives
3.1 – What is Aerodynamics?
3.2 – Brief History of Flight
3.3 – Newton's Laws of Force and Motion
3.4 – Bernoulli's Principle
3.5 – Airfoils
3.6 – Four Forces of Flight
3.7 – Mechanical Design of an Airplane
3.8 – Three Axes of Flight
3.9 – Airspace
3.10 – Traffic Patterns and Minimum Safe Altitudes
3.11 – Pilot-in-Command/Remote Pilot-in-Command
3.12 – How Multicopters Fly
Unit 3 Summary

Unit 4: Getting Started with Tello

Unit 4 Vocabulary
Unit 4 Concepts
Unit 4 Performance Objectives
4.1 – Organizing a Drone Program
4.2 – The Tello Drone
4.3 – The Tello App
4.4 – Your First Flight
4.5 – Programmable
Unit 4 Summary

Unit 5: Overview of Programming

Unit 5 Vocabulary
Unit 5 Concepts
Unit 5 Performance Objectives
5.1 – Programming Defined
5.2 – Why Learn to Code?
5.3 – Visual Programming vs. Syntax Programming
5.4 – Text-based Preferred by "Seasoned" Programmers
5.5 – Tello Comparisons for Programming
Unit 5 Summary

Unit 6: Coding with Scratch

Unit 6 Vocabulary
Unit 6 Concepts
Unit 6 Performance Objectives
6.1 – What is Scratch?
6.2 – Getting Started
6.3 – Basic Flight Skills using Scratch
6.4 – Choosing and Recording Sounds
6.5 – Workshop Safety Rules
6.6 – Adding Sounds to Your Flight Script
Unit 6 Summary

Unit 7: Coding with DroneBlocks

Unit 7 Vocabulary
Unit 7 Concepts
Unit 7 Performance Objectives
7.1 – What is DroneBlocks?
7.2 – Getting Started
7.3 – Get Connected
7.4 – First Flight
7.5 – Saving Your Missions
7.6 – Other Menu Options
7.7 – Creating a Box Pattern
7.8 – Adding Flips
7.9 – Using the Camera Blocks (Mobile App Only)
7.10 – Using Variables
7.11 – Using Math Blocks
7.12 – Using Logic Blocks
7.13 – Using Functions
7.14 – DroneBlocks Curriculum and Membership Options
Unit 7 Summary

Unit 8: Coding with Swift Playgrounds

Unit 8 Vocabulary
Unit 8 Concepts
Unit 8 Performance Objectives
8.1 – What is Swift Playgrounds?
8.2 – Tello Space Travel
8.3 – Other Swift Playgrounds
Unit 8 Summary

Unit 9: UDP and the Tello SDK

Unit 9 Vocabulary
Unit 9 Concepts
Unit 9 Performance Objectives
9.1 – Network Protocols
9.2 – Internet Protocol (IP)
9.3 – User Datagram Protocol (UDP)
9.4 – Using Packet Sender to Communicate with the Tello
9.5 – Customize Packet Sender for your Tello Commands
9.6 – Tello Commands
Unit 9 Summary

Unit 10: Using Mission Pads

Unit 10 Vocabulary
Unit 10 Concepts
Unit 10 Performance Objectives
10.1 - About Mission Pads
10.2 - Creating Missions in Packet Sender
10.3 - Other Mission Pad Resources
Unit 10 Summary

Unit 11: Coding with Python

Unit 11 Vocabulary
Unit 11 Concepts
Unit 11 Performance Objectives
11.1 - About Python
11.2 – Setting Up the Environment
11.3 – Setting Up Thonny
11.4 – Adding the *djitellopy* API to Thonny
11.5 – Flying with the *djitellopy* API
11.6 – Flying X, Y, Z Coordinate Maneuvers
11.7 – Using Asynchronous Commands
11.8 – Taking a Picture Automatically while Flying
11.9 – Viewing Video in Flight
11.10 – Keyboard Control of Flight
11.11 – Flying Mission Pads with *djitellopy*
Unit 11 Summary

Unit 12: Coding with JavaScript

Unit 13: Using the RoboMaster TT

Unit 14: Advanced Programming Skills

CURRICULUM TIMELINE

This curriculum is thorough while allowing for flexibility. The instructor has the option to teach the entire curriculum and have the students compete all the activities, or the instructor can pick, choose, and/or skip any of the activities or quizzes. Instructors may also decide to include projects of their own. Below is a suggested timeline showing minimum and maximum days for each Unit.

(1 day = 60-minute class)

	Description	Minimum # days (if some activities are skipped)	Maximum # days (if all activities completed)
Unit 1: Safety First	Stresses the importance of adopting a "safety attitude" when building and flying a drone. Covers workshop safety and outdoor flying.	3	5
Unit 2: Overview of Drone Design	Covers nomenclature, reputation, configurations, basic components, and current/future uses of drones. Introduces aerodynamics, Newton's Laws of Motion, Bernoulli's Principle, four forces of flight, three axes of flight, how they apply to drone flight.	3	5
Unit 3: Basics of Flight	Introduces aerodynamics, history of flight, Newton's Laws of Motion, Bernoulli's Principle, four forces of flight, three axes of flight, how they apply to drone flight. Reveals issues aircraft pilots encounter including airspace, traffic patterns, and safe altitudes.	5	7
Unit 4: Getting Started with Tello	In-depth introduction to the *Tello* and the *Tello App*. Discusses the special flight features and functions of the drone.	3	5
Unit 5: Overview of Programming	Covers the purpose and types of programming. Discusses the differences between visual and syntax languages.	3	5
Unit 6: Coding with Scratch	Introduces the Scratch 2.0 Offline drag-and-drop program. Includes discussion of setup using node.js.	5	8
Unit 7: Coding with DroneBlocks	Introduces the DroneBlocks App and discusses it's use with loops, variables, and functions.	5	8
Unit 8: Coding with Swift Playgrounds	Introduces the Swift Playgrounds app and using the Tello Space Travel playground.	3	5
Unit 9: UDP and the Tello SDK	Discusses Internet Protocol and communication. Covers using *Packet Sender* to communicate with the Tello.	5	8
Unit 10: Using Mission Pads	Covers the use of Mission Pads using Packet Sender.	3	5
Unit 11: Coding with Python	Introduces coding the drone using Python. Introduces the *djitellopy* API and offers examples for use.	5	8
Unit 12: Coding with JavaScript	Introduces coding the drone using JavaScript. Introduces the advantages of using DroneBlocks Code.	5	8
Unit 13: Using the RoboMaster TT	Introduces the *RoboMaster TT* drone. Explains LED, RGB, and color values. Introduces the Mind+ interface and uploading commands to the ESP32.	5	8
Unit 14: Advanced Programming Skills	Covers use of the *TelloFpv App* for Virtual Reality. Discusses use of a wireless router for Swarming.	5	8
	TOTALS:	**58**	**93**