Canvas Course Curriculum:

Introduction to Drones

### Class Topics

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| **Class #** | **Hours** | **Topics** |
| 1 | 1.5 | Introduction to drones and drone technology. Introduction to drone design and building process. |
| 2 | 1.5 | Introduction to basic drone components and electronics. Introduction to drone design for additive manufacturing. |
| 3 | 1.5 | Introduction to DJI Tello EDU Drone. Introduction to the Drone Programming environment. Introduction to remote drone piloting. |
| 4 | 1.5 | Programming basic movements with the DJI Tello Drone. |
| 5 | 1.5 | Incorporation of conditional loops and logic operators in drone autonomous programming. |
| 6 | 1.5 | Programming Tello drone with mission pad to complete mission tasks. |
| 7 | 1.5 | Programming Tello drone with mission pad to complete mission tasks. Part II |
| 8 | 1.5 | Programming Tello drone with mission pad to complete mission tasks. Part II |

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| **Week #** | **Hours** | **Projects and Tasks** |
| 1-2 | 3 | 1. Understanding remote control of drone using a remote control 2. Understanding basic drone movements and programming basic movement commands |
| 3 | 3 | 1. Programming drone autonomous movements to follow specific path plans to achieve tasks. |
| 4 | 3 | 1. Programming drones to follow mission pads placed at specific locations to complete a mission task. |

***Competency****: What are the key critical pieces that I think my students should have as a result of the* ***process*** *they’ve been engaged in? → these are the things that would become badges*

***Benchmarks****: The steps within each competency*

***Evidence****: Student demonstration of the competency*

# Competency-Based Assessment Tool

# Intro to Drones

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| **Competency** | **Benchmarks** | **Evidence**  *Portfolio, Project-Based, Evaluation, Summative, Formative, Observation* | **Rating**  0-*Not Yet Demonstrated*  *1 - Emerging*  *2 - Competent*  *3 -Highly Competent* | **Narrative Feedback for Student**  *Faculty, Mentor, Peer, Self* |
| *Fluency in understanding the different components of drones and how they correlate each other as a unified system* | *Be able to identify the different subsystems of drones and accurately explain their importance.*  *Be able to implement drone applications to real world situations* | *Observation and summative discussions* |  | *Faculty feedback* |
| *Understand how to utilize text/block coding to create drone movement commands.* | *Be able to program the drone to perform take off and landing movements.*  *Be able to program the drone to move along the six degrees of freedom.* | *Project 1*  *(Weeks 1 and 2)* |  | *Checklist, Rubric* |
| *Demonstrate ability to incorporate sensors into drone movement control* | *Be able to implement sensors in drone autonomous movement along a pre-programmed path.* | *Project 2*  *(Week 3)* |  | *Checklist, Rubric* |
| *Ability to program a d river control function giving student full user control of the drone.* | *Ability to program a n d map controls a nd commands to specific buttons and joysticks.* | *Project 3*  *(Week 4)* |  | *Checklist, Rubric* |

# Competency-Based Assessment Tool

# SAMPLE: SIPP Summer Curriculum

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| **Competency** | **Benchmarks** | **Evidence**  *Portfolio, Project-Based, Evaluation, Summative, Formative, Observation* | **Rating**  0-*Not Yet Demonstrated*  *1 - Emerging*  *2 - Competent*  *3 -Highly Competent* | **Narrative Feedback for Student**  *Faculty, Mentor, Peer, Self* |
| *Fluency using CAD software to develop working prototypes of assigned projects* | *Develop CAD models of moderate complexity using a variety of sketch and modeling tools in novel ways*  *Develop assemblies and sub-assembly using to defined tolerance*  *Develop engineering drawings to workplace standard*  *Refine model, integrating feedback from multiple sources.* | *Student Work from Week 1 Project* |  |  |
| *Demonstrate ability to program microcontrollers to interact with the physical world* | *Attain fundamental concepts of programming: syntax,, language, conditional statements, variables,*    *Develop strategies for Debugging and troubleshooting* | *Series of projects completed using*  *CPX*  *and*  *Arduino* |  | *Checklist /rubric* |
| *Demonstrate ability to build working prototypes in conjunction with physical computing devices* | *Devise plans*  *Use tools and materials for construction*  *Test*  *Iterate on design / troubleshoot* | *Series of projects completed using*  *CPX*  *and*  *Arduino* |  |  |
| *Consistently demonstrating a growth mindset during assigned projects and activities* | *Embrace challenges*  *Persist through setbacks*  *View failures as opportunity for growth*  *Maintain effort & strong work ethic*  *Learn when to ask for help*  *Take inspiration from the setbacks of others* | *Week 1: end of week check-in, reflection*  *Continually evaluated at end of week check-ins* |  | *Checklist/rubric* |
| *Successfully communicates and collaborates with others* | *-Communicates needs, wants, information, negotiates, resolves conflict, and asks for help when needed*  *-Understands giving and receiving feedback and constructive criticism*  *-Develops positive relationships with supportive peers and adults*  *-Participates in group/team activities using teamwork and* [*collaborative problem-solving*](https://www.mediate.com/articles/BernsteinS1.cfm) | *Week 6: end of week check-in*  *Continually evaluated during any group/team activities* |  |  |

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Spectrum Innovates Program

Spectrum Innovates Pathway Program

Spectrum Innovates Pathway Program at Vaughn College

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