Germanna Community College Center for Workforce and Community Education

Unmanned Systems
Governor Terry McAuliffe’s plan to ensure that Virginia rises as the national leader in unmanned systems positions Germanna Center for Workforce and Community Education as a key asset to the training, development, and support of his plan.

Our key strengths for the future of unmanned systems for commercial use, relying heavily on training and workforce development:

- Regional concentration of supportive manufacturing facilities, cybersecurity/data storage companies, agri-business, and military bases within our service region
- Established relationship with leading faculty and subject matter experts
- Fully engaged economic development partners
- Outstanding training and education facilities
Progress, Plans, and Development

- Germanna’s commercial training program formally introduced and demonstrated at the 2015 Culpeper Air Fest with an audience of 6,500

- Current workforce training programs in Unmanned Aerial Vehicles with topics including: pilot training, advance mission planning, physics overview, maintenance, first person view, 3D imaging, photogrammetry, ethics, and safety

- Current community workshops for UAV “Build it Fly it”- All Ages Welcome

- Current UAV customized contract work for business: Chemung Contracting and Cedar Mountain Stone. Training to include photogramics for inventory control of aggregate stone, photo-documentation of roadway construction projects

- Dr. Buzz Aldrin selected Germanna’s Daniel Technology Center as a showcase site for UAV technology where Germanna scholars, Culpeper High School advanced students, and the Boys & Girls Club built a small UAV from ground up.
UAV Drones 101

- An introductory course designed for students with little or no knowledge or experience flying or operating unmanned aerial vehicles or drones.

- At the end of the course students will have a working knowledge of the history and fundamental features, be able to perform simple drone maintenance and the ability to fly the drone safely.
UAV Drones 101

Module 1

- Introduction
- Ethics and Safety
  - Proper and Improper use
  - Safety in Operation
  - Safety in Navigation

Module 2

- Different Types of Drones
- Physics Overview
  - Lift
  - Propulsion
  - Electronics
UAV Drones 101

Module 3

- Multi-rotors
  - Types
  - Components
  - Payloads

Module 4

- Transmitters
  - Limits
  - Exponential
  - Mixing

- Flight Controllers
  - Different types
  - Mission Planner
  - Sensor Integration
UAV Drones 101

Module 5

- Basic Maintenance
  - Tools needed
  - Teardown
  - Prop Balancing
  - Battery Safety

- Basic Maintenance Drills
  - Battery Maintenance
  - Propeller balancing
  - Tear Down

Module 6

- Basic Flight Drills
- Applied Mission Building
  - 3 Practical Group Exercises
An intermediate course designed to build on the fundamental skills learned in UAV Drones 101.

Students will learn about commercial drone use and strategy, advanced autonomous mission planning, first person view flying, and applied photogrammetry and aerial imaging.

Upon completion, students will be fully equipped to execute, either along or in teams, commercial-grade aerial surveys.
UAV Drones 201

Module 1

- Introduction and Review
- First Person View
  - Purpose and Uses
  - Components
  - Radio Frequency Propagation
  - Practical Demonstration

Module 2

- Advanced Mission Planner
  - Flight Modes Review
  - Radio Calibration
  - Compass Calibration
  - Parameters
  - Telemetry Radio Setup
  - Log Retrieval and Analysis
  - Fundamentals of PID
UAV Drones 201

Module 3

- Advanced Autonomous Mission Planning
  - Mission Data Management
  - Region of Interest
  - Spline Waypoint
  - Loiter Time
  - Loiter Turns
  - Return to Launch
  - Land
  - Conditionals
  - Rally Points

- Applied Mission Planning
  - 2 Practical Exercises
Module 4

- Introduction to Aerial Imaging
  - History
  - Definitions
  - Benefits and limitations
  - Camera selection
  - Collection techniques
  - Photo stitching
  - Product creation
  - Job-cost estimates

- Applied Aerial Imaging
  - 2 Practical Exercises
Module 5

❖ Introduction to Photogrammetry
  ❖ Explanation and principles
  ❖ Applications
  ❖ Digital processing methods
  ❖ Mensuration
  ❖ Job-cost estimates

❖ Applied Photogrammetry
  ❖ 2 Practical Exercises

❖ Capstone
Looking to the Future

- Developing plans for a UAV 2017 Fall program for Aerial Surveying program of study to tie into the Apprenticeship program for Land surveying.

- Cohosting a 2016 Symposium with Montpelier and Orange County Economic Development exploring the intersection of U.S. constitutional rights and UMS industry development.

- Development of a 2016 UAV Challenge, The Great Germanna Drone Race, for area high schools for building, programming, and flying Quad copters at Germanna’s Daniel Technology Center in Culpeper, Virginia with the final to be held at the Culpeper Air Show.

- Development of a 2016 program for unmanned land rover use for local agribusiness, e.g., which will use unmanned systems for ground inspection for moisture and temperature assessment.
Questions?