

Germanna
Community College
Center for Workforce
and Community
Education

Unmanned Systems



GERMANNA COMMUNITY COLLEGE • *Center for Workforce & Community Education*

Fredericksburg Area Campus
10000 Germanna Point Drive
Fredericksburg, VA 22408
(540) 891-3012

Daniel Technology Center
18121 Technology Drive
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Stafford County Center
2761 Jefferson Davis Hwy., Suite 107
Stafford, VA 22554
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ONLINE
www.germanna.edu/workforce

Center for Workforce & Community Education

Vision

- ❖ 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



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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.



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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



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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*



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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*



UAV Drones 201



- ❖ 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.



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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*



UAV Drones 201

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*



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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?



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