INSTRUCTORS

JARLATH O’NEIL-DUNNE
joneildu@uvm.edu
802.656.3324
Aiken Center, Room 205
www.uvm.edu/~joneildu

EMMA ESTABROOK
Emma.Estabrook@uvm.edu
802.656.3007
Aiken Center, Room 205E

ABOUT THIS COURSE

DESCRIPTION

This course will study Unmanned Aircraft Systems (UAS) or drones. UAS have provided us with new ways to map, monitor, and measure our changing landscape. UAS are relatively inexpensive, easy to operate, and can deploy rapidly. Advances in digital image processing allow one to go from flying a drone to working with accurate maps and 3D models in a matter of hours. These factors make UAS ideal for many applications in which speed, accuracy, resolution, cost, and timeliness are key factors.

The University of Vermont is pleased to offer a rigorous 3-day course on the use of Drones for geospatial analysis, providing participants with an immersive introduction to the field, with both classroom and field site components designed to teach students both how to operate drones to collect data and how to turn drone photos into information that can be used for a variety of applications. Technologies students will be exposed to include: drone platforms, drone sensors, flight planning software, image processing software, desktop Geographic Information Systems (GIS), and web mapping. Students will work closely with members of the University of Vermont UAS Team, one of the most experience drone groups in the United States.
LEARNING OBJECTIVES

- **Drone Overview**: Safety, platforms, sensors, regulations, capabilities, limitations, and example datasets.
- **Flight Operations Overview**: eMotion demo, flight videos, checklists, and documentation.
- **Flight Planning**: Participants learn how to plan a mission using the flight planning software eMotion and pix4D Capture App.
- **Data Processing**: Students will learn how to process the UAS data collected in the field. They will also learn about the quality report and data products pix4D creates.
- **Data Analysis**: Students will open the collected data in different software and data formats and perform basic analysis.

PREREQUISITES

There are no formal prerequisites for this course. Comfort using desktop computers and basic data management skills are recommended.

FORMAT

UVM’s Unmanned Aircraft System (UAS)/Drone Workshop is comprised of both classroom and field site components, with participants logging about 18 total training hours. After completion of the program, participants will understand how they can employ drones to collect data and gain working knowledge of the technologies required to turn that data into usable information for geospatial analysis.

COMPONENTS

This course consists of seven modules: 1) introduction, 2) flight planning, 3) flight operations, 4) data processing, 5) analytics, 6) data sharing, and 7) considerations. Due to weather considerations, there is flexibility on the order these modules will occur. The first module will introduce students to the capabilities and limitations of using UAS and an overview of UAS platforms and sensors. Module 2 will focus on flight planning including: regulations, airspace, safety checklists, personnel, equipment, and flight planning for photogrammetry. The third model will consist of flight operations. This will include launching and landing fixed-wing UAS and operating multi-rotor UAS for mapping, 3D modeling, virtual reality, and oblique video and image capture. Module 4 will focus on UAS data processing for photogrammetry geospatial products. This will include flight data processing, generating orthorectified imagery, 3D point clouds, and 3D mesh. Module 5 will involve basic analysis of UAS data such as 2D mapping, 3D point cloud analysis, terrain analysis, and volume estimation. Module 6 will teach students how to share UAS data involving online web maps, 3D models, and virtual reality. The final module will go over other UAS considerations such as various case studies, IT backbone, required personnel for a successful UAS program, and organizational challenges.

COURSE MATERIALS

E-LEARNING PLATFORM

This course will use a master Google Document that will include all course materials. Students will have access to this after the course.

TEXTBOOK

There is no textbook requirement for this course.
As UAS flight operations are highly dependent on weather, we will have a flexible course schedule. The course schedule will be posted at the start of each day.

The University of Vermont is an educationally purposeful community seeking to prepare students to live in a diverse and changing world. We who work, live, study, teach, do research, conduct business, or participate in the University of Vermont are members of this community. As members, we believe in the transforming power of education and agree to help create and foster an environment where we can discover and reach our true potential.

We aspire to be a community that values:

RESPECT. We respect each other. We listen to each other, encourage each other and care about each other. We are strengthened by our diverse perspectives.

INTEGRITY. We value fairness, straightforward conduct, adherence to the facts, and sincerity. We acknowledge when things have not turned out the way we had hoped. As stewards of the University of Vermont, we are honest and ethical in all responsibilities entrusted to us.

INNOVATION. We want to be at the forefront of change and believe that the best way to lead is to learn from our successes and mistakes and continue to grow. We are forward-looking and break new ground in addressing important community and societal needs.

OPENNESS. We encourage the open exchange of information and ideas from all quarters of the community. We believe that through collaboration and participation, each of us has an important role in determining the direction and well-being of our community.

JUSTICE. As a just community, we unite against all forms of injustice, including, but not limited to, racism. We reject bigotry, oppression, degradation, and harassment, and we challenge injustice toward any member of our community.

RESPONSIBILITY. We are personally and collectively responsible for our words and deeds. We stand together to uphold our common ground.

Your instructor will oversee all aspects of the course. You should expect your instructor and teaching assistants to be knowledgeable, professional, approachable, and take an interest in your performance in this course.

Student should be guided by UVM’s “Our Common Ground” principals throughout this course. Students requiring any accommodations for this course should notify the instructors at the start of class.