Course Change Request

New Course Proposal

Date Submitted: 10/05/18 12:14 pm

Viewing: FRSC 516 : Forensic Drone Photography

Last edit: 10/05/18 12:14 pm

Changes proposed by: kcarisi

Are you completing this form on someone else's behalf?

No

In Workflow

1. **FRSC Representative**
2. **SC Curriculum Committee**
3. SC Associate Dean
4. Assoc Provost-Graduate
5. Registrar-Courses
6. Banner

Approval Path

1. 10/05/18 12:15 pm Emily Rancourt (erancour): Approved for FRSC Representative

Effective Term:	Spring 2019
Subject Code:	FRSC - Forensic Science
Course Number:	516
Bundled Courses:	
Equivalent Courses:	
Catalog Title:	Forensic Drone Photography
Banner Title:	Forensic Drone Photography
Will section titles vary by semester?	No
Credits:	3
Schedule Type:	Lecture

Hours of Lecture or Seminar per week:

Repeatable: May only be taken once for credit (NR)

Default Grade Mode: Graduate Regular

Recommended Prerequisite(s):
None

Recommended Corequisite(s):
None

Required Prerequisite(s) / Corequisite(s) (Updates only):
None

Registrar's Office Use Only - Required Prerequisite(s)/Corequisite(s):

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?

Registration Restrictions (Updates only):

Registrar's Office Use Only - Registration Restrictions:

Field(s) of Study:

Class(es):

Level(s):

Degree(s):

School(s):

Catalog Description:
This course explores the rapidly expanding use of Unmanned Aerial Systems (UAS) or Unmanned Aerial Vehicle (UAV) also referred to as a drone to assist forensic investigators to document scenes. These capture platforms allow the user to document events using both video and photographs from a vantage point not easily obtained. The data collected can then be further extracted to form maps and models of the scene.

Students in this course will first be taught the knowledge and skills necessary to apply for a FAA Part 107 Commercial Drone (UAS) license. Next, they will develop their piloting skills to capture data through a series of lectures and practical problems typically found by forensic investigators. Finally, a survey of legal requirements for drone use and procedures to follow to seek authorizations to fly in certain areas.

Justification:

This unique course explores the rapidly expanding use of Unmanned Aerial Systems (UAS) or Unmanned Aerial Vehicle (UAV) also referred to as a drone to assist forensic investigators to document scenes. These capture platforms allow the user to document events using both video and photographs from a vantage point not easily obtained up to this point. The data collected can then be further extracted to form maps and models of the scene. This course is unique in that it will not only provide students with the opportunity to apply for their commercial drone pilots license but apply this knowledge through practical applications. Many agencies both private and government are utilizing drones to capture scenes for a variety of reasons. For example, aside from crime scenes and major incidents, public safety organizations are utilizing drones to map special event locations to pre-plan for security. Students with this certification and practical knowledge of UAVs on their resumes will be very attractive to potential employers interested in utilizing this technology.

Does this course cover material which crosses into another department? No

Learning Outcomes:

- Students will be provided with the necessary training, so they can successfully apply for a UAV Commercial Pilots License.

- Students will be able to properly assess a situation so that safe operations of a UAV may be conducted along with seeking proper legal authorizations and exemptions from appropriate entities.

- Students will learn the effective and safe operation of a UAV both inside and outside various structures using practical problems.

- Students will learn methods to properly image forensic crime scenes using a UAV. This will include the use of mapping and modeling software to create effective and demonstrative evidence.

- Students will be exposed to other uses of a UAV for law enforcement, public safety, military, and intelligence operations.

- Students should recognize and apply critical or orthogonal thinking concepts regarding the application of UAVs to various forensic applications.

Attach Syllabus

Forensic Drone Photography Syllabus 2018 10-03-2018.pdf

Additional Attachments

Staffing:

Steven Burmeister

Relationship to Existing Programs:

One of the hallmarks of the GMU Forensic Science Program is providing students with the most current knowledge and cutting-edge tools in the rapidly advancing world of Forensic Science. This course will expand upon the current course offerings as an elective in all four concentrations within the Master of Science in Forensic Science Degree (Crime Scene Investigations, Forensic Biology, Forensic Chemistry, and Forensic/Biometrics Identity Analysis concentrations).

Relationship to Existing Courses:

The proposed course is unique to other courses offered at GMU and will provide students with the opportunity to not only learn about Drones but also to apply for their commercial drone pilot license. The proposed course will complement and enhance the excellent crime scene documentation courses already being taught in the GMU Forensic Science Program.

Additional Comments:

This particular course has received provisional endorsement by the GMU Environmental Health and Saftey representative Beth Brown who manages the approvals for active use of drones on campus.

Reviewer Comments

Key: 15980

Forensic Drone Photography
FRSC 516

Instructor: **Professor Steve Burmeister**

Office: **Exploratory Hall Room 3405**

Email: **sburmei@gmu.edu**

Phone: **703-993-4537 (Office)**

Textbook: **(Provided in class in electronic form)**

Office Hours: **Email to set up appointments**

Course Description: This course explores the rapidly expanding use of Unmanned Aerial Systems (UAS) or Unmanned Aerial Vehicle (UAV) also referred to as a drone to assist forensic investigators to document scenes. These capture platforms allow the user to document events using both video and photographs from a vantage point not easily obtained. The data collected can then be further extracted to form maps and models of the scene. Students in this course will first be provided the knowledge and skills necessary to apply for a FAA Part 107 Commercial Drone (UAS) license. Next, they will develop their piloting skills to capture data through a series of lectures and practical problems typically found by a forensic investigator. Finally, a survey of legal requirements for drone use and procedures to follow to seek authorizations to fly in certain areas.

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effective and demonstrative evidence.

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- Students should recognize and apply critical or orthogonal thinking concepts regarding the application of UAV's to various forensic applications.

Blackboard: Students are responsible for acquiring all lectures and handouts on Blackboard prior to attending class each week; the instructor will not bring copies of these documents to class. If you miss a class it is the student's responsibility to ask a peer for missed notes; you may only contact your instructor if you have questions regarding the missed material. In most instances, material will be available on Blackboard no later than 24 hours before class time each week.

Student Responsibilities/Participation: It is expected that students will read the assigned sections of the text prior to class so as to facilitate discussion and participation in the lecture and exercises. Several class exercises will be given throughout the semester in which each student is expected to sufficiently participate in the exercise; failure to participate will result in a deduction of participation points for that day.

Attendance: Students are expected to attend every class, arrive on time, and remain in class until the session is over. Class attendance is essential to fully understand the course material and will contribute to the final grade. Each student must sign an attendance sheet each week at the beginning of class; students who come to class late are responsible for seeing the instructor to sign the sheet. Signing someone else's name on the attendance sheet is an Honor Code Violation and will be reported to the Office of Academic Integrity.

Additionally, some very important points are often made in lecture that may not be presented in the textbook or in the PowerPoint slides; this information may be used for examination purposes. Students unable to attend class due to illness or other unforeseen circumstances should e-mail the instructor prior to class. Please while in class turn off cell phones as well as any other distracting electronic devices.

Materials and Supplies: Students will also be required to bring their Mason Student ID to quizzes and exams, ID's will be checked upon turning in of exams/quizzes. Failure to show Student ID will result in a grade of zero on the exam/quiz.

Quizzes & Exams: There will be no make-up quizzes or exams. Only in emergency situations (i.e. serious illness, travel due to death in the family) will the instructor arrange for the quiz/exam to be taken at another time; however, students are responsible for notifying the instructor prior to the start of the quiz/exam that they will not be in attendance. Any notifications received after the start of the quiz/exam will not be granted arrangements and a grade of zero will be given. If arrangements are granted for pre-notifications, students must show physical documentation of their absence i.e. doctors note, hospital release papers, etc. The quiz/exam must be taken as soon as reasonably possible.

Grading:

- **Participation & Attendance (10%)**
- **Quiz # 1 – 1st quarter (15%)**
- **Homework and Practical Problems - (10%)**
- **Mid-term (Preparation Quiz for Part 107 Exam) (25%)**
- **Quiz #2 - (15%)**
- **Final Exam (25%)**
- ***Extra Credit (2% added to Total Percentage Grade)***

100 A+	**87-89 B+**		
95-99 A	**83-86 B**	**70-79 C**	**0-69 F**
90-94 A-	**80-82 B-**		

Note: The schedule is subject to change, please listen for announcements during class.
Note: Additional reading assignments may be added throughout the semester.

UNIVERSITY RESOURCES

GMU Honor Code:

Standards of academic integrity as set forth by the University are strictly observed and rigorously enforced in this class. The complete Honor Code is as follows: *To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal*

achievement, we, the student members of the university community, have set forth this honor code: Student members of the George Mason University community pledge not to cheat, plagiarize, steal, or lie in matters related to academic work.

GMU Email: http://masonlive.gmu.edu
Each student is responsible for activating their GMU email account and checking their account on a regular basis for University and class announcements.

GMU Police Policy: 703-993-2810
If you are currently employed with a law enforcement agency as a sworn officer and would like to carry a firearm on campus and into class, you must contact GMU Police Department as a courtesy.

GMU Students with Disabilities: http://ods.gmu.edu
If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Resources at 703-993-2474. All academic accommodations must be arranged through that office; your instructor is not obligated to make accommodations without documentation from ODS.

Writing Center: http://writingcenter.gmu.edu
For general questions and comments please contact wcenter@gmu.edu or call:
703-993-1200 (Robinson Hall A114, Fairfax Campus)
703-993-1824 (Enterprise Hall 076, Fairfax Campus)
703-993-4491 (Arlington Campus)
703-993-8451 (Prince William Campus)

All appointments are made through the online scheduling system so please do not email or call to schedule appointments. If you would like to cancel an appointment you may do so via the online scheduler, simply select your appointment and click the "Cancel appointment" box at the bottom of the reservation form and then "save".

University Libraries: "Ask a Librarian" http://library.gmu.edu/mudge/IM/IMRef.html
Margaret Lam, Physical Sciences Liaison Librarian; http://infoguides.gmu.edu/forensics
Fenwick Library, A244
703-993-2212
mlam3@gmu.edu

Counseling and Psychology Services (CAPS): (703) 993-2380; http://caps.gmu.edu

University Policies:
The University Catalog, http://catalog.gmu.edu, is the central resource for university policies affecting student, faculty, and staff conduct in university academic affairs. Other policies are available at http://universitypolicy.gmu.edu/. All members of the university community are responsible for knowing and following established policies.

University policy states that all sound emitting devices shall be turned off during class unless otherwise authorized by the Professor.
All Cellular phone usage during class is not permitted unless authorized by the Professor
Use of computers will be allowed in class as long as it is related to class material (Note taking, class presentation, lab report).

Course Syllabus

- **Section 1 Drone Pilot Essentials and Certification**
  - ➢ Applying for a Part 107 Drone Pilot Certification
- **Section 2 Practical Experience and Forensic Photography**
  - ➢ Flight Experience and Requirements before you fly
  - ➢ Forensic Photographical methods and Post Processing of Collected data
  - ➢ Forensic and Legal Implication of Aerial Drone Imagery
  - ➢ Practical Problems

Section 1 Drone Pilot Essentials and Certification

- ➢ Applying for Part 107 Drone Pilot Certification

Class 1 (1/22)
Introduction and Welcome

Regulations
- Part 107 Definitions
- Registration Requirements to obtain a part 107 remote pilot certificate with a small unmanned aircraft system (small UAV) rating
- Conditions for Safe Operations
- PIC Responsibilities
- Visual Observers
- Visual Line of Sight

- Hazardous Operations
- Daylight Operations
- See and Avoid of Other Aircraft
- Eligibility Requirements
- Waiver Policy Characteristics of small unmanned aircraft systems (small UAV) as stipulated in part 107
- Exclusions from the requirements in part 107
- Requirements for small UAV registration, markings, and condition
- Procedures for requesting a waiver for eligible requirements in part 107

Class 2 (1/29)

Airspace

- National Airspace System
- Operations in Controlled Airspace
- Operations in Uncontrolled Airspace

Airport Operations

- Operations near Towered & Non-Towered Airports
- Runway Markings and Signage
- Traffic Patterns

Flight Restrictions

- Safety and legal Considerations
- No fly Zones
- Prohibited and Restricted areas
- TFRs
- Special Use Airspace
- Other Airspace

Class 3 (2/5)

Interpreting Aviation Charts

- Navigation Basics
- Chart Interpretation
- Section Charts (In Class Exercise)

Aviation Weather

- Atmospheric Basics
- Types of Weather
- Weather Planning
- Weather Briefings

- Current Conditions (METARs)
- Aviation Forecasts (TAFs)
- Weather Factors and Their Effect on a UAV

QUIZ NUMBER 1 (15% of Total Grade)

Class 4 (2/12)
Aviation Weather (Continued)

******Homework Assignment (Weather Briefing and use of Sectional Chart (Note Graded assignment)**

Radio Communications

- Communications Around Airports
- ATIS
- Standard Communications
- Self-Announce Procedures
- Common Traffic Advisory Frequency (CTAF)
- UNICOM / MULTICOM
- Traffic Pattern Communications

Maintenance and Pre-Flight Procedures

- Recommended maintenance procedures for small UAV
- Scheduled & Unscheduled Maintenance
- Preflight Inspection
- FAA Inspection & Testing
- Record Keeping and log Books
- Inspection requirements to verify that the small UAV is in condition for safe operation
- Operational requirements and limitations for small UAV

Class 5 (2/19)
Weight and Balance and UAS performance

- Basic Aerodynamics
- Aircraft Loading
- Weight & Balance
- Stability and Control
- Center of Gravity
- Longitudinal Stability
- Performance Data

Hazards before/during/and after flight and Handling Emergencies

- Flight Hazards
- Accident Factors and Reporting
- Reporting In-Flight Emergencies
- Abnormal and emergency situations that may arise during small UAV operations
- Emergency Communications
- Lost Link/Fly Away
- Battery Low/Battery Fire
- System Malfunction
- Loss of GPS Signal

Crew Resource Management

- Hazards & Risks
- Decision Making
- Risk Management
- Crew Resource Management and best practices
- Possible supporting crew roles in small UAV operations
- PIC Responsibilities
- Visual Observers
- Visual Line of Sight
- Crew Coordination
- Hazardous Attitudes

Class 6 (2/26)

Crew Resource Management (Continued)

Pilot Physiology

- Stress
- Fatigue
- Dehydration
- Heat Stroke
- Hyperventilation
- Vision Impairment
- Impact of Drugs & Alcohol
- Determining Fitness for Flight

Part 107 Exam

- Registering
- Exam Logistics
- Applying for Remote Pilot Certificate with a UAV Rating
- Updating your Address

MIDTERM EXAM (Part of 107 Study Test) (25% of Total Grade)

Class 7 (3/5)
Part 107 Exam (2 hours)

Section 2 Practical Experience and Forensic Photography

Class 8 (3/19) and Class 9 (3/26)

Flight Experience and Requirements before you fly

- Types of Drones
- Choosing Your Drone
- Parts of a Drone
- Drone Setup
- DJI Go App Walkthrough
- Pre-Post flight Checklist
- General Equipment (Refresh Crew Resource Management, Eye Safety, Proper Clothing (Vest), First Aid Kit)
- Flight Briefing
- Approvals (George Mason University) COA, Public Safety Use
- Flight Modes
- ***Practical Exercise: #1***- Learn to Fly
  - ✓ *Flight Simulator Training*
  - ✓ *Takeoff and landing a Drone*
  - ✓ *Hovering a Drone*
  - ✓ *Maneuvering the aircraft*

Class 10 (4/2)

Photographical methods and Post Processing of Collected Imagery data

- ***Practical Exercise: #2***- Fly a pre-designated area
  - ✓ *Fly a rectangular pattern*

- ✓ *Fly a circular (Oval) Pattern*
- ✓ *Capture Video and Photographs*

- Photographic Techniques (Capture Methods)
- Drone Photo Settings
- Drone Video Settings
- Processing Methods for Drone imagery
  - Mapping vs 3D Modeling
  - DSM Data (Digital Surface Modeling)
  - Accessories and different types of Payloads to capture imagery (ex FLIR)
  - PIX 4D Software

QUIZ NUMBER 2 (15% of Total Grade)

Class 11 (4/9)

In Class Practical Exercise #3 **(Use of Software and image processing)**

Class 12 (4/16)

Practical Exercise #4

- ✓ Collect imagery data for a Body in the Middle of a field (Photograph, Video, Mapping, and Modeling)

Class 13 (4/23)

Practical Exercise #5

- ✓ Collect Imagery date from a crime scene (Auto Accident) (Photograph, Video, Mapping, and Modeling)

Class 14 (4/30)

Forensic and Legal Implication of Aerial Drone Imagery

- Use in Court
- Review for Final
- **Wrap Up Course and Final Thoughts**

Final Exam (Date to be determined) (25% of the Total Grade)