Environmental Science, Policy, and Management (ESPM) 3480/5480

Drones: Data, Applications, and Operations

Syllabus

<u>Course Description</u>

This course explores principles and techniques of Unmanned Aircraft Systems (UAS, also "drones"), applied to natural resource and environmental issues. The course provides hands-on experience with UAS vehicles, sensors, imagery, and software. Course topics include: UAS flight characteristics, regulations/safety, mission planning, flight operations, data collection, image analysis, and applications. Examples of UAS applications to be explored include: forest and natural resource inventory, wetland monitoring, and land cover mapping. Prior coursework in Geographic Information Systems is recommended. 2 credits

Meetings: 9:35-11:15am Fri, 35 Skok Hall, St. Paul Campus

Instructors:

Dr. Joe Knight
Dept. of Forest Resources
301E Green Hall
Phone: 612-625-5354
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Office hour: Fri. 11:30-12:30 or by appt.

Dan Heins, M.S.
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Office hour: Weds. 1:00-2:00 or by appt.

Text: There is no required text for this course.

<u>Course Goals:</u>

Upon completion of this course, students are expected to have achieved:
- Safe and legal operation of UAS in the current regulatory framework
- Knowledge of UAS vehicle and sensor types and functions
- Proper planning and execution of UAS missions
- Processing and analysis of UAS data

<u>Grades and Workload</u>

This two-credit course will require, for the average University of Minnesota student, six hours of academic work per week, averaged over the term. Since the course meets for roughly two hours per week, you should expect to spend an additional four hours per week on average outside the classroom.

Grades will be assigned by earned point values as described below. No "curve" will be applied. No extra credit opportunities will be available. Plus/minus course grades will be assigned. Any grading challenges you wish to be considered should be emailed to the instructor within one week of the posting date of the graded item. You must state what is to be reevaluated and include a specific rationale for why the grade is improper or incorrect. "I put a lot of time into this, and I think I deserve a better grade," does not constitute an acceptable rationale.

Course point break-down:

	Points
Prep items	10
In-class activities	10
Flight practical	20
Mini-project (collection)	15
Mini-project (processing)	15
Mini-project (analysis)	15
Mini-project (report)	15
Class Total	**100**

Letter Grades
A -- achievement that is outstanding relative to the level necessary to meet course requirements.
B -- achievement that is significantly above the level necessary to meet course requirements.
C -- achievement that meets the course requirements in every respect.
D -- achievement that is worthy of credit even though it fails to meet fully the course requirements.
S -- achievement that is satisfactory, which is equivalent to a C- or better.
F (or N) -- Represents failure (or no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an Incomplete.
I -- (Incomplete) Assigned at the discretion of the instructor when, due to extraordinary circumstances, e.g., hospitalization, a student is prevented from completing the work of the course on time. Requires a written agreement between instructor and student.

Incompletes (I) will be assigned only in extraordinary circumstances, such as prolonged illness, and will require a signed contract with the instructor. Such written agreement will not allow a period longer than six months from the end of the course to complete the course requirements. Students taking this course using S/N grading must complete all assignments and earn a cumulative grade of C- or higher to earn an S (Satisfactory); students earning a D+ or lower will

receive a grade of N.

Classroom Conduct

All students at the University have the right to a civil, productive, and stimulating learning environment. In turn, instructors have a responsibility to nurture and maintain such an environment. Students who disrupt the educational process because of discourteous, threatening, harassing, or other aggressive behavior will be removed from class.

- Please arrive on time and stay the entire class period. If you must arrive late or leave early, please sit near the door and try to enter or exit quietly.

- Turn off or silence your electronic devices (e.g. cellphones, laptops) before class begins.

- If you use a computer during class, please refrain from using it for non-course-related activities, as this may distract other students.

- Avoid eating meals during class (drinks or light snacks are ok).

Absences and Late Policy

You are expected to be present for all class meetings. You are responsible for *documenting* the legitimacy of any absences. Legitimate absences include:

- illnesses certified by Boynton Health Service or your family physician

- emergencies caused by a death or serious illness in your immediate family

- participation in intercollegiate athletic events or other official University activities

- subpoenas, jury duty, military service, and religious observances

If you know that you will need to be absent on a particular day, let the instructor know beforehand. To submit a late assignment without penalty, you must provide documentation of your absence. Otherwise late assignments will be subject to a 25% penalty provided they are submitted within one week of the scheduled due date; late assignments will not be accepted after one week except in the case of a documented legitimate absence.

Student Academic Integrity and Scholastic Dishonesty

You are expected to do your own academic work and cite sources as necessary, including your own prior work. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration

on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (Student Conduct Code: http://www1.umn.edu/regents/policies/academic/Student_Conduct_Code.html). If it is determined that a student has cheated, he or she may be given an "F" or an "N" for the course, and may face additional sanctions from the University. For additional information, please see: http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html.

The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: http://www1.umn.edu/oscai/integrity/student/index.html. If you have further questions, please see the instructor.

Accommodations for Students with Disabilities

The University is committed to providing quality education to all students regardless of ability. Determining appropriate disability accommodations is a collaborative process. You as a student must register with Disability Services and provide documentation of your disability. The course instructor must provide information regarding a course's content, methods, and essential components. The combination of this information will be used by Disability Services to determine appropriate accommodations for a particular student in a particular course. For more information, please reference Disability Services: http://ds.umn.edu/student-services.html.

Student Mental Health and Stress Management

As a student, you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Minnesota services are available to assist you. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health Website: http://www.mentalhealth.umn.edu.

Sexual Harassment

Sexual harassment means unwelcome sexual advances, requests for sexual favors, and/or other

verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, please consult Board of Regents Policy:

http://www1.umn.edu/regents/policies/humanresources/SexHarassment.html

Equity, Diversity, Equal Opportunity, and Affirmative Action

The University will provide equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. For more information, please consult Board of Regents Policy:

http://www1.umn.edu/regents/policies/administrative/Equity_Diversity_EO_AA.html

Date	Day	Topic
1/19	F	Course intro, syllabus review, intro to UAS, history
1/26	F	Regulations and safety / FAA Part 107 intro
2/2	F	Vehicles and sensors
2/9	F	Applications of UAS
2/16	F	UAS photogrammetry
2/23	F	Mission planning
3/2	F	FAA Remote Pilot test prep
3/9	F	Image processing
3/16	F	SPRING BREAK
3/23	F	Image processing
3/30	F	Image analysis
4/6	F	Intro to UAS flight / GPS-assisted flight
4/13	F	Flight setup practical
4/20	F	Mini-project
4/27	F	Mini-project
5/4	F	Societal issues, future of UAS, course wrap-up