

**Course Outline for NAVI 201**

**ORIENTATION TO DRONES AND UNOCCUPIED AERIAL SYSTEMS (UAVS)**

**Effective: Spring 2022**

**I. CATALOG DESCRIPTION:**  
 NAVI 201 — Noncredit

This course introduces students to the fundamentals of drones and Unoccupied Aerial System (UAVs) focused on mission planning, basic flight operations and the legal (local, state, and federal) and ethical frameworks in order to safely operate a UAV.

**Grading Methods:**  
 Pass/No Pass

**Discipline:**  
 • Aviation

**Noncredit Category**  
 J - Workforce Preparation

	<b>MIN</b>
<b>Total Noncredit Hours:</b>	27.00

**II. PREREQUISITE AND/OR ADVISORY SKILLS:**

**III. MEASURABLE OBJECTIVES:**

**Upon completion of this course, the student should be able to:**

- A. Evaluate the legal (local, state, and federal) and ethical frameworks in order to safely operate common Unoccupied Aerial Systems (UAS), more commonly referred to as drones.
- B. Safely operate a UAS and perform a controlled take-off, demonstrate basic flight controls, and execute a landing.
- C. Describe the varied uses of an Unoccupied Aerial System (UAS) in multiple disciplines and careers.

**IV. CONTENT:**

- I. UAS Uses
  - A. Real Estate
  - B. Agriculture
  - C. Building Inspection
  - D. Public Safety
    - 1. Police
    - 2. Fire
    - 3. Search and rescue
  - E. Surveying/Mapping
  - F. Wildlife management
  - G. Forest management
  - H. Video production
    - I. Photography
    - J. Architecture
    - K. Journalism
    - L. Equipment maintenance
- II. Mechanics of Flight
  - A. Weather
  - B. Aerodynamics
    - 1. Lift
    - 2. Drag
    - 3. Roll
    - 4. Pitch
    - 5. Yaw
- III. UAS Equipment and Technology
  - A. Size
    - 1. Micro
    - 2. Mini
    - 3. Small
    - 4. Large
  - B. Type
    - 1. Glider
    - 2. Wing Body
    - 3. Helicopter

- 4. Ducted Fan
- 5. Quadcopter
- 6. Hexcopter
- 7. Fixed-wing
- C. Features
  - 1. GPS
  - 2. Cameras
  - 3. Controllers
- D. Propulsion
  - 1. Electric
  - 2. Gas
- E. Performance
  - 1. Speed
  - 2. Battery Life
- F. Parts
  - 1. Body
  - 2. Motors
  - 3. Propellers
  - 4. Batteries
  - 5. Cameras
  - 6. Controllers
  - 7. Storage Options
- IV. Safety and Ethics
  - A. Personal Safety
  - B. Property Safety
  - C. Privacy Concerns
- V. UAS Laws and Regulations
  - A. FAA Regulations
    - 1. Airspace Issues
    - 2. Hobby vs. Commercial usage
    - 3. Licensing
  - B. Local Law
  - C. State Laws
- VI. Flying
  - A. Flight planning
  - B. Hovering and Tilting
  - C. Flight Patterns
    - 1. Tracking
    - 2. Following
    - 3. Waypoints
  - D. Flight Logging
  - E. Aircraft Maintenance
- VII. FAA Certification
  - A. Remote Pilot
  - B. Weather
  - C. Charts
  - D. Air Traffic Control
  - E. Visual Line of Sight (VLOS)

## V. LAB CONTENT:

- I. UAS Equipment and Technology
  - A. Size
    - 1. Micro
  - B. Type
    - 1. Quadcopter
  - C. Features
    - 1. GPS
    - 2. Cameras
    - 3. Controllers
  - D. Performance
    - 1. Speed
    - 2. Battery Life
  - E. Parts
    - 1. Body
    - 2. Motors
    - 3. Propellers
    - 4. Batteries
    - 5. Cameras
    - 6. Controllers
    - 7. Storage Options
- II. Safety and Ethics
  - A. Personal Safety
  - B. Property Safety
  - C. Privacy Concerns
- III. UAS Laws and Regulations
  - A. FAA Regulations
    - 1. Airspace Issues
    - 2. Hobby vs. Commercial usage
    - 3. Licensing
  - B. Local Law
  - C. State Laws
- IV. Unassisted Flying
  - A. Flight planning
  - B. Take off and Landing
  - C. Hovering and Tilting
  - D. Obstacle Navigation
  - E. Point tracking

- V. Assisted flying
  - A. Flight planning
  - B. Desktop vs. Phone Apps
  - C. Flight Patterns
    - 1. Tracking
    - 2. Following
    - 3. Waypoints
- VI. Flight Logging
- VII. Aircraft Maintenance
- VIII. Storage and Data backup

VI. METHODS OF INSTRUCTION:

- A. **Written Exercises** - Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.
- B. **Discussion** - The description and explanation of case studies from FAA that describe common ethical and legal circumstances.
- C. **Demonstration** - The demonstration of proper operating procedures for the set-up, flying, and landing of different types of UAS.
- D. **Guest Lecturers** - The inclusion of speakers who represent active users of UAS technology with private commercial operations and public entities, such as water districts, state parks, city government, and state institutions.
- E. **Lecture** - Review of textbook and related teaching materials using traditional lecture formats accompanied by audio/visual software, hand outs, and online guides.
- F. **Student Presentations** - Students may explain and discuss their own original work using various methods including demonstrations, lecture, audio visual presentations, and other interactive means to convey their findings and receive active feedback.

VII. TYPICAL ASSIGNMENTS:

- A. Ten to twenty pages of reading per week
- B. Digital imaging drone project proposal: contains rough ideas, sketches, shots that team members will create, required equipment, along with a description of the message to convey to target audience
- C. Weekly forum posts on class-related topics
- D. FAA exam preparation worksheets
- E. Midterm and Final exams
- F. Written paper discussing job possibilities in this developing industry

VIII. EVALUATION:

**Methods/Frequency**

- A. Exams/Tests  
twice
- B. Quizzes  
every two weeks
- C. Papers  
every two weeks
- D. Projects  
once

IX. TYPICAL TEXTS:

1. Barnhart, R. Kurt, Douglas Marshall, and Eric Shappee. *Introduction to Unmanned Aircraft Systems*. 2nd ed., CRC Press, 2018.
2. Federal Aviation Administration (FAA). [Pilot's Handbook of Aeronautical Knowledge](#). Federal Aviation Administration (FAA), 2016.
3. Remote Pilot - Small Unmanned Aircraft Systems Study Guide (FAA-G-8082-22), Federal Aviation Administration (FAA) (Free online PDF)

X. OTHER MATERIALS REQUIRED OF STUDENTS: