



# REMOTE SENSING CURRICULUM OVERVIEW

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Penn State University  
Dutton e-Education Institute  
Online Geospatial Programs

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## Motivation

- Remotely sensed data and derivative products are found in almost every GIS project
- GIS software contains basic analysis tools for most types of remotely sensed data
- Fundamentals of remote sensing should be taught in a comprehensive, structured manner not as bits and pieces in other courses
- Experience has shown that one course in the curriculum is not enough to address all students



# Current Offerings

- Geog 480: (Schuckman)
  - Exploring Imagery and Elevation Data in GIS
- Geog 481: (Schuckman/Renslow)
  - Topographic Mapping with Lidar
- Geog 883: (Schuckman/O'Neil-Dunne)
  - Remote Sensing Image Analysis and Applications
- Geog 589: (Schuckman)
  - Emerging Trends in Remote Sensing
- Geog 892: (Abdullah)
  - Geospatial Applications of Unmanned Aerial Systems
- *Geog 497B: (Schuckman)*
  - *Fundamentals of Photogrammetry and Aerial Mapping*



# Software

- ArcGIS
  - Spatial Analyst
  - 3D Analyst
  - Image Analysis
- GeoCue/QCoherent LP360 (3D Point Cloud)
- eCognition (Object-Based Image Analysis)
- QuickTerrainModeler (3D Visualization and Analysis)
- Pix4D and PhotoScan (UAS Mapping)
- Pure File Magic (waveform and bathymetric lidar)

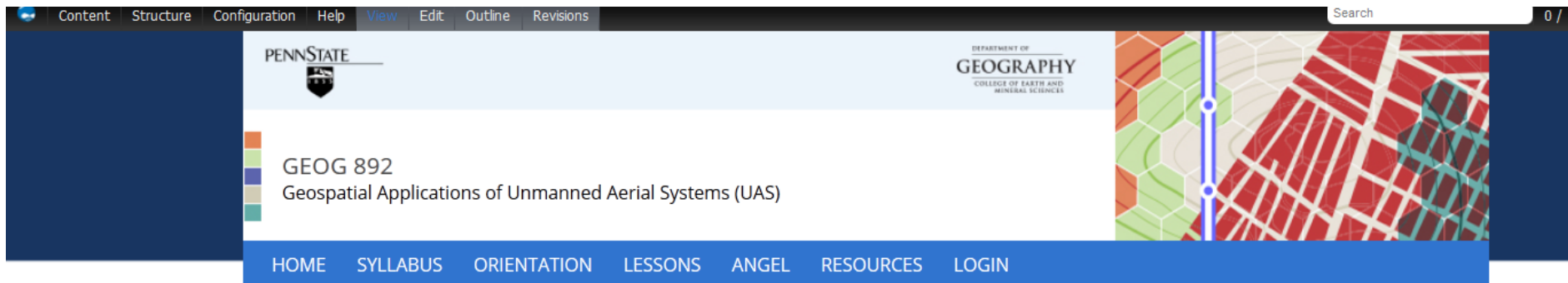


**GEOG892:**

# **Geospatial Applications for Unmanned Aerial System (UAS)**

**Instructor: Dr. Qassim Abdullah**  
Lecturer, Penn State  
Senior Geospatial Scientist, Woolpert, Inc.

# Completely On Line Offering



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PENNSSTATE DEPARTMENT OF GEOGRAPHY COLLEGE OF EARTH AND MINERAL SCIENCES

GEOG 892  
Geospatial Applications of Unmanned Aerial Systems (UAS)

HOME SYLLABUS ORIENTATION LESSONS ANGEL RESOURCES LOGIN

## 4.1 Studying Area Maps [Print](#)

Welcome to section 4.1! In this section you will understand the value of studying area maps for a project prior to the development of the flight plan.

The flight planner should acquaint him or herself with the project area through two types of maps before proceeding with further steps of the design; those are U.S. Topo Quadrangle Maps and Sectional Aeronautical Charts.

### U.S. Topo Quadrangles Map

The U.S. Topo Quadrangles Map, mainly a topographic map, shows the details of the contours of the land (terrain elevation). See figure 4.1. This type of map reveals all information that a planner needs about the topography in the project area. Topography affects flight plan parameters such flight lines, spacing, and imagery spacing. Quad maps can be downloaded from the [USGS](#). You can also review a sample of such maps for the [State College area](#).



GEOG 892: Geospatial Applications of Unmanned Aerial Systems (UAS)

Logged in as [qaa3](#).

### Lessons

- ▶ Lesson 1: Introduction to the Unmanned Aerial System
- ▶ Lesson 2: Unmanned Aerial System Elements
- ▶ Lesson 3: Concept of Operation (CONOP) and Risk Assessment for UAS
- ▼ Lesson 4: UAS Mission



# GEOG 892 Highlights

- Offered **twice** a year\*\*:
  - **Spring 2** Semester: Feb. 24 to May 04, 2016
  - **Fall 1** Semester: August 17 to Oct. 26, 2016
- **10 weeks** semester
- **Totally online** offering
- **For Course review:** <https://www.e-education.psu.edu/geog892/>

\*\* [https://gis.e-education.psu.edu/programs/class\\_calendar](https://gis.e-education.psu.edu/programs/class_calendar)

# Geospatial Applications for Unmanned Aerial System (UAS): Course Outlines

- sensors and platforms;
- civilian and remote sensing applications;
- sensors calibration and boresighting;
- Operational requirements of the UAS, **CONOP**;
- data processing software;
- derived digital data products such as ortho-rectified imagery and digital terrain surface;
- current rules and regulations governing owning and operating a UAS in the United States.



# Geospatial Applications for Unmanned Aerial System (UAS): Course Objectives

**Upon course completion, students shall be able to:**

- Assess commercially available UAS and its suitability for the job.
- Assess commercially available data processing software and its suitability for the job.
- Describe the basic principles of UAS operation requirements and develop Concept of Operation (CONOP).
- Assess risks surrounding operating a UAS and propose mitigation for such risks.
- Design a UAS-based aerial imagery operation.
- Design a UAS-based flight mission.
- Evaluate strength and weakness of different phases of the design.
- Recommend a procedure for sensor calibration.
- Recognize and recommend potential applications of the UAS for GIS operations.
- Apply acquired knowledge and critical thinking skills to solve a real-world problem with appropriate UAS acquisition and data processing and analysis methods.
- Produce geospatial products such as ortho photos and digital terrain models.
- Advise users on the rules and regulations on operating an UAS.



# Course Textbooks

1) Textbook 1: ***Introduction to the Unmanned Aircraft Systems***, edited by Richard K. Barnhart, Stephen B. Hottman, Douglas M. Marshall J.D., Eric Shappee.

2012, CRC Press, Taylor & Francis Group ISBN 978-1-14398-3520-3 (no edition number). (The book is available on sites such as Amazon)

2) Textbook 2: ***Introduction to UAV Systems (Aerospace Series)*** 4th edition, By Paul G. Fahlstrom, Thomas J. Gleason. 2012, Wiley, John & Sons, Incorporated

ISBN-13: 9781119978664. (is offered as an eBook through PSU libraries)

3) Textbook 3: ***Elements of Photogrammetry with applications in GIS*** 4th edition By Wolf, P. and B. Dewitt. 2014. McGraw-Hill. ISBN-13 9780071761123.

## Geospatial Applications for Unmanned Aerial System (UAS): Weekly Assignments and Grading:

*Students earn grades that reflect the extent to which they achieve the learning objectives.*

Opportunities to demonstrate learning include:

- ✓ **8 online quizzes (32 points or 32%)**
- ✓ **9 activities including on line discussions or reports development (37 points or 37%)**
- ✓ **1 final project (31 points or 31%)**



# Thank You!

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