

Geography (GEOG) 3319: Geographic Field Techniques

Fall 2022

Time: TR 12:15 pm- 1:30 pm

Location: Lewis Science Center 174

Instructor: Yaqian He, PhD

Office: Lewis 036

Office Hours: TR 10:00- 11:50 am

**Course Contributions**

Several people helped me to develop this course by providing advice, data, or materials. Specifically, I would like to acknowledge the contributions of Dr. Aaron Maxwell from WVU, Dr. Matthew Connolly from UCA, and staffs from DroneCamp and National Geospatial Technology Center of Excellence. I am also grateful to MITOPENCOURSEWARE, ESRI online source, and Stanford University for sharing open course resource.

**Course Description**

Global Navigation Satellite Systems (GNSS) has well advanced people’s life. This course is designed to introduce fundamental concepts and theory of GNSS, using GNSS receivers for positioning, navigating, tracking, and data logging in the field, and integrating field data into GIS software. This course also introduces basics of Unmanned Aerial Vehicle (UAV) and how it could be combined with GNSS to collect high resolution data. Finally, this course explores several online mapping methods for visualizing and analyzing collected field data.

**Course Outcomes**

After completing this course, a student will be able to:

1. explain GNSS principles and concepts
2. collect spatial data using GPS and cell phone through Esri Collector and Suvey123
3. implement field data into GIS software (Esri ArcGIS)
4. produce maps using ArcGIS online mapping technique
5. explain UAV concepts and regulations
6. fly UAV
7. process UAV images using GIS software (Esri ArcGIS)
8. address a spatial problem using collected data

**Course Framework**

This course will use a combination of lectures, demonstrations, lab exercises, and field work. The instructor firmly believe that students learn via engagement and doing. As a result, large portions of the class time will be set for lad exercises and field work. It is important that you engage yourself during this class. The instructor will do her best to help you learn, however, it is imperative that you take ownership of your own education.

**Recommended Text**

1. *Understanding GPS: Principles and Applications* edited by Elliott D. Kaplan and Christopher J. Hegarty (ISBN-10: 1580538940; ISBN-13: 9781580538947)
2. *Fundamentals of Capturing and Processing Drone Imagery and Data* edited byAmy E. Frazier and Kunwar K. Singh (ISBN 9780367245726)

**Required software**

1: ArcGIS online account, provided by Geography department

2: ArcGIS Pro 3.0, provided by Geography department

3: DJI Ground Station Pro, freely available

**Required hardware**

1: TDC GPS, provided by Geography department

2: DJI Phantom IV, provided by Geography department

**Grading**

Grading for this course will consist of nine lab exercises, one homework, one quiz, and a project. The detailed showed in the Table 1 and Table 2.

It is important that all lab exercises and assignments be completed in a timely manner. Some bonus exercises maybe provided. ***Labs and assignments that are not turned in by the due date can be turned in up to 2 days late with a 20% penalty.*** Labs will not be accepted after this 2-day period.

**Table 1 Grade distribution**

|  |  |  |
| --- | --- | --- |
| **Item** | **Points** | **Description** |
| Lab exercises | 50 points each, 450 points total | 9 lab exercises. Each will be provided with guidelines. |
| Homework | 50 points | 1 homework |
| Quiz | 5 points each, 50 points total | 10 multiple choice questions |
| Project | 50 points | Project data collection |
| 100 points | Project Presentation, peer-reviewed |
| 100 points | Project Report |
| Total | 800 Points |  |

**Table 2 Grade Scale**

|  |  |  |
| --- | --- | --- |
| 90%- 100% | A | > 720 points |
| 80%- 90% | B | > 640 Points |
| 70%- 80% | C | > 560 Points |
| 60%- 70% | D | > 480 Points |
| 0%- 60% | F | < 480 Points |

This course does not have exams. It requires a final project. The project is a **group project**. Three or four students will be in a group to finish the project. The groups will be determined in the class. The project topic and study area will be designed by the instructor. The project will include:

**Project data collection**: Use GPS/cell phone and Survey123/Collector to collect your project data at designed locations

**Project presentation**: Your group will give a 15-minute (2-3 minutes for Q&A) presentation of your project to the class

**Project report**: A final report with 8-10 pages without references, and with a 12 font of Time New Roman and line spacing 1.5 lines.

The project report will be graded by the following criteria:

**Table 3 Criteria**

|  |  |
| --- | --- |
| **Structure** | **Contents** |
| **Title (& your affiliation)** | Describe interestingly and succinctly the contents of the paper |
| **Introduction** | State motivation and objectives of the study. Include literature reviews if possible. |
| **Study area** | Describe your study area |
| **Data & Methods** | Describe how do you collect your data and how do you visualize and analysis your data |
| **Results** | Explain the major findings from the data analysis |
| **Conclusions** | Summarize major content and draw common themes |
| **Reference** | List cited papers/web sources/textbooks by the reference format in the sample paper\* |

\* See the sample peer-reviewed scientific journal, Sample paper\_He et al (2022), in the Blackboard.

**Attendance Policy**

1. Attendance is mandatory
2. Class will begin promptly, so please show up on time. ***If you are more than 10 minutes late for an exam or final presentation, it will not be completed, and you will receive a grade of zero on the examination.***
3. ***Consistent with University of Central Arkansas guidelines, excessive absences (up to 3 times) may jeopardize students’ grades and the instructor reserves the right to remove you from the class permanently.***

**Feedback Response Time**

The instructor generally replies to email within 48 hours, except during holidays. Often the instructor replies much more quickly, but you should not count on a same-day reply. Please plan accordingly so that you don’t miss deadlines.

**Classroom Etiquette**

1. Switch cell phones off and place them out of view. Do not use phones during class. Resist the impulse!
2. Computers are permitted for note-taking only.
3. Do not sleep in class or leave once a lecture has started
4. Do not pack up and prepare to leave until the instructor has indicated that class is over
5. No eCigarettes permitted in the classroom.
6. You are encouraged to think critically and ask stimulating questions, but always respect your fellow students and your instructor.

**COVID-19 adaptation**

According to the guidance of the University of Central Arkansas responding to COVID-19, this class in the Fall will be an in-person format. The class schedule has followed this guidance. However, the schedule maybe changed, and we will transfer to virtual format if face-to-face delivery is interrupted. All students are expected to know and comply with university policy related to Covid-19. For information and resources, see <https://uca.edu/coronavirus/>.

Please stay healthy. If you feel any symptoms of COVID-19 (e.g., fever of 100.4 degree last two days, a cough, difficulty breathing, a sore throat), please contact your healthcare provider or the Student Health Clinic (<https://uca.edu/studenthealth/>).

**Academic Integrity Statement**

The University of Central Arkansas affirms its commitment to academic integrity and expects all members of the university community to accept shared responsibility for maintaining academic integrity. Students in this course are subject to the provisions of the university’s Academic Integrity Policy, approved by the Board of Trustees as Board Policy No. 709 on February 10, 2010, and published in the *Student Handbook*. Penalties for academic misconduct in this course may include a failing grade on an assignment, a failing grade in the course, or any other course-related sanction the instructor determines to be appropriate. Continued enrollment in this course affirms a student’s acceptance of this university policy.

**Accommodations**

The University of Central Arkansas adheres to the requirements of the Americans with Disabilities Act. If you need an accommodation under this Act due to a disability, please contact the Office of Accessibility Resources and Services (OARS), 450-3613.

**Building Emergency Plan statement**

An Emergency Procedures Summary (EPS) for the building in which this class is held will be discussed during the first week of this course. EPS documents for most buildings on campus are available at <http://uca.edu/mysafety/bep/>. Every student should be familiar with emergency procedures for any campus building in which he/she spends time for classes or other purposes.

**Diversity Statement**

The University of Central Arkansas is dedicated to attracting and supporting a diverse student, faculty, and staff population and enhanced multicultural learning opportunities. We value the opportunity to work, learn, and develop in a community that embraces the diversity of individuals and ideas, including race, ethnicity, religion, spiritual beliefs, national origin, age, gender, marital status, socioeconomic background, sexual orientation, physical ability, political affiliation, and intellectual perspective (<https://uca.edu/diversity/institutional-diversity/>).

**Title IX disclosure**

In furtherance of its core values— academic vitality, integrity, and diversity—UCA is dedicated to promoting a campus community free from discrimination. Title IX of the Education Amendments Act of 1972 requires all educational institutions to address gender-based discrimination on campus, and UCA implements these Federal requirements through a fair, consistent, and appropriate process of investigation and adjudication. Please see UCA’s Title IX website (<https://uca.edu/titleix/>) for the university’s policy, relevant forms, training opportunities, and related information.

Evaluations

Student evaluations of a course and its professor are a crucial element in helping faculty achieve excellence in the classroom and the institution in demonstrating that students are gaining knowledge. **Students may evaluate courses they are taking starting on Monday, Nov 21 2022, through Sunday, Dec 18, 2022 by logging in to myUCA and clicking on the Course Evaluations task.**

*\* indicates UAV textbook*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Week** | **Date** | **Tuesday** | **Thursday** | **Project Due Dates** | **Source Material** |
| W1 | Aug. 22-26 |  | Introductions, Syllabus, ArcGIS Online Accounts |  | Ch 1, Ch3 |
| W2 | Aug. 29- Sep. 2 | Coordinate and Time Systems | Orbits and Signals |  | Ch 2, Ch 4 |
| W3 | Sep. 5-9 | Pseudoranges and Error Sources | GPS Receivers & GPS Augmentation |  | Ch 5, Ch 6, Ch 7, Ch 8, Ch 9 |
| W4 | Sep. 12-16 | Future and Applications of GNSS  Project Introduction | Mission planning  H#1 GPS Mission Plan |  | CH 10, Ch 11, CH 12 |
| W5 | Sep. 19-23 | GPS Practice in campus  Quiz #1 | ESRI Survey123  Lab #1 Survy123 Design | *H#1 Due by Beginning of Class Time on Thursday* |  |
| W6 | Sep. 26-30 | ArcGIS Collector  Lab #2 Collector Design | Lab # 3 Design Your Group Project | *Lab#1 Due by Beginning of Class Time on Thursday* |  |
| W7 | Oct. 3-7 | Data Collect with Survey123 in Campus | Data Collect with Collector in Campus | *Lab #2 &3 Due by Beginning of Class Time on Thursday* |  |
| W8 | Oct. 10-14 | Drone Image Collection Overview | Drone Image Collection Overview  Lab #4 Drone Mission Plan |  | Ch 1\*, Ch 4\*, Ch 5\* |
| W9 | Oct. 17- 21 | Lab #5 Plan Your Group Drone Mission | *Fall Break* |  |  |
| W10 | Oct. 24- 28 | Drone Practice in campus | Dr. He Away for Meeting | *Lab # 4 & 5 Due by Beginning of Class Time on Tuesday* |  |
| W11 | Oct. 31-Nov. 4 | Group Data Collection: Field Trip to TBD | |  |  |
| W12 | Nov. 7- 11 | Group Data Collection: Field Trip to TBD | |  |  |
| W13 | Nov. 14-18 | Web GIS  Lab #6 ArcGIS Online Mapping 1 | Lab #7 ArcGIS Online Mapping II |  |  |
| W14 | Nov. 21- 25 | Lab #8 Processing Drone Images with ArcGIS Pro I | *Thanksgiving Break* | *Lab #6&7 Due by Beginning of Class Time on Thursday* |  |
| W15 | Nov. 28- Dec. 2 | Lab #9 Processing Drone Images with ArcGIS Pro II | Project Analysis | *Lab #8 & Project Data Due by Beginning of Class Time on Tuesday* |  |
| W16 | Dec. 5-9 | Project Analysis | Project Report | *Lab #9 Due by Beginning of Class Time on Tuesday* |  |
| W17 | Dec. 12- 16 | Project Presentation |  | *Project Report due by Beginning of Class Time one Thursday* |  |