

# ENVS 421/521 GIS IV: ADVANCED APPLICATIONS

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CREDITS: 4

TIME: 2:00-3:50 TR

ROOM: AH 16

INSTRUCTOR: Dr. Aquila Flower

OFFICE: AH 209

OFFICE HOURS: M 2:00-3:00, T 10:00-11:00, W 3:00-4:00, or by appointment

HOW TO CONTACT ME: please use Canvas messages

TA: Donal O'Leary

OFFICE HOURS: T 1:00-2:00, R 1:00-2:00, or by appointment

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GIS SPECIALIST: Stefan Freelan, AH 201, Email: [stefan@wvu.edu](mailto:stefan@wvu.edu). 650-2949.

TEXT:

No required text. Readings will be distributed on Canvas.

## COURSE DESCRIPTION:

This course is the middle stage in the year-long ENVS 420-421-422 / 520-521-522 series. Students are expected to begin the term with an intermediate level of GIS knowledge and skills. We will explore advanced techniques for the collection, processing, analysis, and visualization of geospatial data.

Students will improve their GIS data production, editing, and management skills through lessons focused on georeferencing, using remotely sensed data, collecting GPS data, and customizing geodatabases. Students will become familiar with advanced GIS tools for specialized applications such as hydrological modeling, display of 3D data, and network analysis. Students will improve their written, verbal, and visual communication skills through report writing, in-class presentations, and cultivation of advanced cartographic skills.

## COURSE STRUCTURE:

Lectures will occur during the first hour of class. The second hour of class will be spent working on hands-on lab activities. Students are expected to stay for the entire class period. Labs will require additional work outside of our regularly scheduled class period. Most work will be individual assignments, but students are expected to review and critique each other's work on a regular basis.

Reading is moderate but expectations for class participation are high. This includes regular attendance (extremely important), active class participation in discussion (both in person and online), quick assimilation of new computer programs and the ability to work effectively with others in the lab.

## SCHEDULE

| Date             | Lab                   | Subject   |
|------------------|-----------------------|---|
| Jan 6            | Portfolio, Due Jan 13 | Introduction, portfolio   |
| Jan 8, 13, 15    | Lab 1, Due Jan 20     | Georeferencing, digitizing, coded domains                                       |
| Jan 20, 22, 27   | Lab 2, Due Jan 29     | Remote sensing, land cover classification, change detection                     |
| Jan 29, Feb 3, 5 | Lab 3, Due Feb 10     | GPS, topologies   |
| Feb 10, 12, 17   | Lab 4, Due Feb 19     | Hydrological modeling<br>Geometric networks                                     |
| Feb 19, 24, 26   | Lab 5, Due Mar 3      | 3D-analysis, spatiotemporal analysis  |
| Mar 3, 5, 10, 12 | Lab 6, Due Mar 13     | Advanced spatial analysis:<br>network analysis, kriging,<br>regression analysis |

## **ASSESSMENT:**

My grading system is designed to reflect each student's mastery of the course material. The grades I assign represent how much of the material you understand, not how hard you worked or your standing relative to other students in the class. An A indicates knowledge beyond the requirements of the course; a B mastery of the material in the course; a C an average understanding; and anything less than this would indicate gaps in understanding. The final letter grades will be assigned on a straight percentage: 93% = A, 90% = A-, 87% = B+, 83% = B, 80% = B-, 77% = C+, 73% = C, 70% = C-, >60% = D, <60% = F.

**Labs (60%):** We will complete six hands-on lab activities. You will generally have three class periods to complete each lab. Labs are due before the beginning of class on the day listed in the syllabus. During the third class period devoted to each lab, you will bring a draft of one map and complete a peer review of another student's work. Late labs lose 10% each day they are late, including weekends. Most lab materials should be submitted via Canvas, data should be submitted via the S: drive.

**Final research paper and presentation (20%):** Each student will write a research proposal for a quarter-long original GIS-focused research project. This will involve conducting a small original research project involving the collection, processing, analysis, and visualization of spatial datasets. This research will be a pilot project used to assess the feasibility of your intended research project for ENV5 422/522. Data, methods, results, discussion, and plans for ongoing research will be included in a 6-10-page (double-spaced, times new roman 12 point font) research proposal. The paper will contain a literature review with references within the text, and bibliographic citations for at least 5 articles found in peer-reviewed scientific journals. Each student will also give a brief (<5-minute) presentation on their proposal in class.

**Portfolio (7%):** Each student will create an online portfolio showcasing their GIS skills and accomplishments. Each lab should be posted in this portfolio.

**Quizzes & In-class Activities (5%):** Pop quizzes and in-class activities will be given sporadically in class, usually before the lecture begins. No make-up opportunities will be available.

**Participation (5%):** Participation in our online and in-class learning communities. This includes asking and answering questions in class, posting questions and answers on our Canvas discussion board, and sharing interesting GIS-related articles/sites on our class Facebook page.

**Map critiques (3%):** Thoughtful, constructive critiques of your classmates' maps will be completed for each lab.