

**ENVE 455/555 Geographic Information Systems**

**University Crossings D301**

Tuesdays 6:30 – 9:20 pm

**Instructor: Nicholas A. Procopio, Ph.D., GISP**

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**Course Description:**

This introductory course is technically oriented and will provide a foundational understanding of GIS in an environmental context. This course is structured to provide an understanding of GIS principles and practices and to apply spatial investigation procedures to analyze geographic data. This introductory course will provide an overview of mapping and computer systems, attribute and spatial data models, data organization in GIS, GIS data analysis, and future trends for this technology.

This course is also designed to encourage students to think more broadly about the use of spatial technologies and practices and how they influence people and the environment. Students will be required to develop an independent project relating to their research interests and which incorporate techniques learned throughout the semester.

The class period will be divided into a lecture period and a laboratory period. The lecture will occur during the first part of the class and will include the theory and concepts behind GIS. The laboratory will follow the lecture and will include demonstrations and provide you with an opportunity to work with GIS software.

**Learning Outcomes:**

- Understand the fundamental theory of Geographic Information Systems (GIS) and build an awareness of how GIS can (and cannot) be used.
- Learn how to use ArcGIS including: ArcMap™, ArcCatalog™, and ArcToolbox™ and explore how these applications work together to provide a complete GIS solution.
- Effectively operate ArcView software
- Understand the importance of map projection, datums, and coordinate systems
- Describe, assess, and compare common map elements and the cartographic design process.
- Gain enhanced spatial analysis and GIS modeling skills based on vector and raster data models and tabular data.
- Design and implement an independent GIS project to address applied problems and/or research questions.

**Prerequisites:**

There are no prerequisites but some background in cartography, computer science or geography is helpful. You NEED to be a proficient computer user. Basic understanding of Microsoft windows directory structure and how applications work in that environment are necessary skills.

**Required Text:**

*Lecture:* Bolstad. GIS Fundamentals 6th Edition: A first text on GIS

*Laboratory:* Law and Collins. Getting to Know ArcGIS 5th Edition. For ArcGIS10.6

### **Course Evaluation:**

You will be evaluated based on several components. The percentage each component will contribute to your final grade is shown below:

|                               |     |
|-------------------------------|-----|
| <b>Tests</b>                  | 25% |
| <b>Laboratory Exercises</b>   | 30% |
| <b>Independent Assignment</b> | 35% |
| <b>Class Participation</b>    | 10% |

#### **Tests (25%)**

There will be one exam in this course. It will be administered during finals week and must be completed to pass the course. It will be available via BlackboardLearn so be sure you can access your account and the class.

#### **Laboratory (30%)**

The laboratory portion of the course allows students to perform standard GIS operations using the leading GIS software, ArcView. The laboratory portion will take place immediately following the lecture. The laboratory exercises will be completed by utilizing the required laboratory text. Upon completion of each assignment, a screen capture or printout of the final display will be submitted for evaluation.

#### **Independent Assignment (35%)**

Each student will draft and complete an independent project. Students will be required to complete a report and analysis detailing how GIS can be used in their studies or current research. Students will develop a project that utilizes GIS to answer a specific question. For this project, students should focus on describing the initiative and procedures as well as an analysis. Specifically, provide an overview of the project and state what you intend to investigate, develop, or analyze. Describe exactly how GIS is going to be incorporated. Describe what data layers will be needed, how they will be obtained, how they will be displayed, and how they will be analyzed. Additionally, a map or a schematic of the final product, if it cannot be represented in map form, will be required. Results will be presented to the class in the form of a short presentation. Your final write-up should be formatted like a research paper and include a background/introduction, methods, results, conclusion, and references.

Presentations will be graded on three components; how you handle yourself (5 pts), content of the discussion (i.e. does your content convey your message) (7 pts), and described use of GIS techniques (10 pts). The paper will be scored out of 20 points which will incorporate readability, organization, contents (as above), use of GIS, inclusion of references, grammar and punctuation. A total of 42 points can be earned but your overage independent assignment grade will be scored as a percentage.

#### **Class Participation and Attendance (10%)**

Class participation includes answering questions when asked, participating in class discussions, and exhibiting appropriate non-disruptive behavior. You will be given class participation for each week of class. You will automatically receive full credit for class participation. It is your responsibility to keep the credit. You will lose credit for class participation if you are disruptive or exhibit inappropriate behavior.

#### **Extra Credit:**

Students may complete exercised 14a-c and or 20a-b as extra credit or to cover a missed assignment.

#### **Grading Scale:**

|        |    |       |    |
|--------|----|-------|----|
| 97-100 | A+ | 77-79 | C+ |
| 93-96  | A  | 73-76 | C  |
| 90-92  | A- | 70-72 | C- |
| 87-89  | B+ | 67-69 | D+ |
| 83-86  | B  | 60-66 | D  |
| 80-82  | B- | <60   | F  |

**Classroom Policies:**

- Turn cell phones off! Text messaging is obvious from my vantage point in the front of the class.
- Laptops may be used – but avoid social media sites.
- Participation points may be deducted whether I directly tell you about it or not.
- Leaving class early does not count as having attended.

**Course Policies:**

- Please review the University policies on academic dishonesty at: [www.drexel.edu/provost/policies/academic\\_dishonesty.asp](http://www.drexel.edu/provost/policies/academic_dishonesty.asp), and <http://drexel.edu/studentlife/judicial/honesty.html>.
- Students with disabilities requesting accommodations need to present a current accommodation verification letter (AVL) to the Professor before accommodations can be made. AVLs are issued by the Office of Disability Services (ODS). The ODS can be contacted at: [www.drexel.edu/ods](http://www.drexel.edu/ods), by phone at 215-895-1401, or TTY at 215-895-2299. For further information, see: [http://www.drexel.edu/ods/student\\_reg.html](http://www.drexel.edu/ods/student_reg.html)
- Please review the University policies on dropping a course at: [http://www.drexel.edu/provost/policies/course\\_drop.asp](http://www.drexel.edu/provost/policies/course_drop.asp)

**CLASS SCHEDULE** (subject to change)

| <b>Date</b>           | <b>Lecture Topic</b>                          | <b>Chapter (Bolstad)</b> | <b>Laboratory Exercises (Law and Collins)</b> | <b>Supplemental Activities</b>      |
|-----------------------|---|--------------------------|---|-------------------------------------|
| Sept 24               | Introduction and applications                 | 1                        | Chapters 1 & 2                                | Introductions                       |
| Oct 1                 | Data Models, Tables                           | 2, 8                     | Exercise 3a-d, 4a-c                           | Aerial photography<br>Land-use data |
| Oct 8                 | Datums, Projections, and Coordinates          | 3                        | 6a-d, 5a-c                                    | arcgis.com                          |
| Oct 15                | Digital Data, Imagery                         | 6, 7                     | 7a-d, 8a-c                                    | Project Review                      |
| Oct 22                | Maps, Data, and editing                       | 4                        | 9a-d, 10a-d                                   | Data Input                          |
| Oct 29                | Spatial Analyses                              | 9                        | 11a-b, 12a-b,                                 | Species Location<br>Analysis        |
| Nov 5                 | Raster Analyses                               | 10                       | 13a-c, 15a-b                                  | Vector-based spatial<br>analysis    |
| Nov 12                | Spatial Estimation                            | 12                       | 16a-b, 17a-c,                                 | Raster-based spatial<br>analysis    |
| Nov 19                | New Developments in GIS                       | 15                       | 18a-d, 19a-c, 20a-b                           | Model builder                       |
| Nov 26                | <b>Thanksgiving – NO CLASS</b>                |                          | Extra Credit: 14a-c<br>and/or 20a-b           |                                     |
| Dec 3                 | Presentation of Independent Projects          |                          |   |                                     |
| Finals Week<br>Dec 10 | EXAM and Presentation of Independent Projects |                          |   |                                     |

**Exercise data** and a free software trial can be accessed from <http://esripress.esri.com/bookresources>