GEOGRAPHY (GEOG) 4600:
GEOSPATIAL PROGRAMING AND ONLINE METHODS
SPRING SEMESTER 2020

Meeting Time:	TO BE DETERMINED
Location	TO BE DETERMINED
Instructor:	Ryan J. Frazier, Ph.D. Departments of Geography & Earth and Environmental Sciences
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Office Hours:	TO BE DETERMINED OR by appointment

REQUIRED MATERIALS

- **Texts (not finalized….)**
  1) Paul A. Zandbergen, *Python Scripting for ArcGIS*, ESRI Press, 2014.
  2) Pinde Fu, *Getting to Know Web GIS*, 3rd edition, ESRI Press, 2018.

- **Software**
  Access to the latest ArcGIS software.
- **Other Items**

ADDITIONAL MATERIAL

There will be additional readings throughout the semester.

COURSE DESCRIPTION & OBJECTIVES

- As more and more of everyday life migrates into a virtual online environment, our desire to explore, describe, understand, and model our planet is no exception. This course focuses on two essential components of that geographic online experience: geospatial programing and online methods. Half of the course is devoted to customizing GIS software applications by way of modified service interface elements. Topics include the theory and implementation of the various scripting languages (Python for example) currently in use. With these skillsets, students will be able to solve geospatial problems, extend functionality, and streamline/automate GIS workflows through the creation and modification of scripts. The other half of the course is aimed at the design, publishing, and optimization of geospatial servers, and to maintenance of basic geospatial web services and applications. This will include an introduction to browser and mobile-enabled interactive applications such as those found on cellular phones. Mapping applications using geospatial APIs and Javascript will be covered as well. Ultimately, this course prepares students to not only be users of geospatial technology, but also be able to customize and personalize geospatial applications and distribute them over a wide range of web-friendly devices and interfaces.

Increasingly, profession geospatial technicians count both programing and web methods among their most useful and skillsets, and employers often list them as highly desirable.

- *The specific objectives of the course are:*
    - To provide an understanding of how to customize GIS software applications by way of modified service interface elements. Topics include the theory and implementation of the various scripting languages currently in use.
    - To introduce the design, publishing, optimization of geospatial servers, and maintenance of basic geospatial web services and applications.

STUDENT LEARNING OUTCOMES (SLOS)

By the end of the course, students are expected to:

- Students will produce solutions to automate geoprocessing functions using a variety of programming methods, structures, and data sources.
- Students will use a scripting language to modify and create geoprocessing scripts.
- Students will construct, compile, and troubleshoot computer code according to best practices.
- Students will solve geospatial problems and streamline GIS workflows through the design and development of custom GIS applications.
- Students will modify user interfaces to increase productivity.
- Students will configure a geospatial server.
- Students will use existing templates or content building tools to design and build basic Web-based geospatial application.
- Students will publish geospatial resources to a web service.
- Students will perform basic maintenance of geospatial applications and services.
- Students will use and explain the use of SDKs in the development of mobile mapping applications.

PREREQUISITES AND/OR COREQUISITES

- GEO 4200

LAB FEES

- None

COURSE POLICIES

Methods of Evaluation: Grades are based on overall performance, measured by the scores earned from **exams, lab exercises, and a final project** assigned during the semester. This course will use the standard +/- grade scale in accordance with university policy. Final grades will be awarded using the following percentage scale that is based on the total number of points earned divided by the total number of available points. I reserve the right to make slight adjustments in the various cutoffs based on the total point average for the class. However, any adjustments will NEVER be upward, resulting in a lower grade.

A	93.0+%	B-	79.0-81.9%	D+	66.0-68.9%

A-	89.0-92.9%	C+	76.0-78.9%	D	63.0-65.9%
B+	86.0-88.9%	C	72.0-75.9%	D-	60.0-62.9%
B	82.0-85.9%	C-	69.0-71.9%	E	<60.0%

Exams (40% of grade)
Labs (35% of grade)
Final Project (25%)

Methods of Instruction:

- Lecture Discussion
- Learning Modules
- Audio-Visual
- Collaborative Learning
- Lecture-Lab Format
- Computer Assisted Instruction
- Lab/Class Exercises

COURSE OUTLINE

Week	Date	UNITS	SLOs (number)	Labs Due
1		UNIT 1 **Basics of geoprocessing and its languages**		
		Lab 1:		
2		UNIT 2 **Programming fundamentals 1**		
		Lab 2:		Lab 1
3		UNIT 3 **Programming fundamentals 2**		
		Lab 3:		Lab 2
4		UNIT 4 **Working with maps, layers and layer rendering**		
		No Lab		Lab 3
5		UNIT 5 **Data access and creation with geodatabase**		
		Lab 4:		---
6		***EXAM 1***		
		Lab 5:		Lab 4
7		UNIT 6 **Working with geometry and selections**		
		No Lab		Lab 5
8		UNIT 7 **Introduction to geospatial server system**		
		Lab 6:		---

9		UNIT 8 **Publish geospatial resources to Web services**		
		No Lab		Lab 6
10		UNIT 9 **Customize Web applications**		
		Lab 7:		---
11		***EXAM 2***		
		Lab 8:		Lab 7
12		UNIT 10 **Introduction to HTML5, CSS, and JavaScript**		
		Lab 9:		Lab 8
13		UNIT 11 **Introduction to Web API**		
		Lab 10:		Lab 9
14		UNIT 12 **Web application development**		
		No Lab		---
15		UNIT 13 **Introduction to deploy mobile applications**		
				Lab 10
		EXAM 3		

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