

GEOG 435/535 – GIS Programming

Instructor: Dr. Arthur J. Lembo, Jr.

Office: Henson Hall 157H

Office Hours: M,W,F 9:00-11:00am; (also by appointment)

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Class Meetings: MW 3 – 4:15 p.m. Henson Hall 153

Course Description: This course will introduce the basics of programming and its applications in geographic research. This will focus primarily on writing SQL statements and python programs with **both commercial and open source GIS**. After finishing this class, students are expected to be able to write their own programs to automate geographic tasks.

Text: We will be using a combination of .pdf files and video lectures. ALL students must have access to headphones, and bring them to class as we will have numerous video exercises to work through in class. The reasons for the video exercises are due to a much more rapid pace of learning.

Grading: This course has a total of 8 quizzes, and numerous work projects during the semester, in addition to a final programming project. Each quiz is worth 5 points, each work project is worth 5 points, the final project is worth 25 points, and class participation is worth 10 points (a total of **100 points**). Failure to complete an assignment will cause a deduction in your class participation grade.

Some of your assignments will be from the ESRI Virtual Campus - **DO NOT PURCHASE THE COURSES** - our license with ESRI allows free use for students. Your Professor will give you the access codes.

***Note:** graduate students will be required to complete a separate research project that accounts for 10 percent of their final grade. Therefore, the final project for graduate students is 15 points, and the supplemental research project is 10 points. The supplemental research project will relate to topics such as evaluating the relative speeds of different GIS algorithms or hardware configurations, or might be comparing the algorithmic intensity of two different commercial software packages.*

Special note on projects: Each student will select a simple programming project to complete. You may ask your professor or other faculty in the

Department or University about an interesting geographic problem they would like automated. Students will submit a one-page description of the project they want to complete. Students may work on the projects in class during the third week of November. During that time, they will be able to receive assistance from the instructor. However, it is anticipated that the projects will also require some out-of-class time as well. During the last week of class, students will give a 10 minute presentation of their project. Details will follow in class.

Expectations and Responsibilities: Students are expected to have a basic knowledge of computer systems and data processing methods using both Windows and command line operations similar to that found in older DOS-based programs. Students should be able to communicate with the instructor using electronic mail, and to access and search the Internet for data and information relevant to the course. A working knowledge of Word, Excel, and Powerpoint is helpful.

A major responsibility of the instructors is to promote an active learning environment in the course which requires instructors and students to be motivated, participatory, and communicative. Lecture assignments, quizzes, and exams are designed to be conducted independently. Instructors and students are expected to adhere to Salisbury University's code of academic integrity.

Students with special needs: Students with special needs (i.e. untimed tests, etc.) must contact the Vice President of Student Affairs (3-6082) for the appropriate documentation. For students who need special arrangements for taking exams, *you must bring me a letter at least 1 week before the first exam.*

Attendance: Attending class is important. Coming to class, paying attention and taking notes is the best way to learn the course material. Most lectures will come from the lecture notes and will only be presented in class. If I sense that you are not coming to class, I will purposefully assign quizzes or projects during those class times and you will not receive points for those activities, and your class participation grade will suffer as well.

Classroom Environment: Students are expected to contribute to an environment appropriate for learning that considers and respects the needs and rights of others. Any academic misconduct will be confronted and handled accordingly. Please silence all electronic devices while in class. **Do not arrive late and do not leave early.**

***** [PLEASE NOTE SCHOOL POLICY FOR THE H1N1 VIRUS](#) *****

Academic Integrity: Cheating, plagiarism and other forms of academic dishonesty will not be tolerated in this course. Students should pay special attention to the expectations discussed in the 2005-2006 Student Handbook and 2005-2007 University Catalog. Violating these rules will result in significant grade penalties up to and including a failing grade for the course. Extreme cases of academic misconduct can result in expulsion from the University.

Writing Across the Curriculum: All writing assignments, both formal and informal, are in support of Salisbury University’s Writing Across the Curriculum Program.

Important University Dates for Fall

Last day to drop/add – Sept 2

Last day to withdraw from course to receive a “W” – October 28

Changes to Syllabus: This syllabus may be modified or changed by the instructor as necessary. Students will be notified of the changes in class.

**FINAL EXAM: FRIDAY DECEMBER
16. 4:15 – 6:45 (Don’t shoot the messenger).**

Date	Topic	Assignment
<u>Monday, August 29, 2015</u>	Course Introduction, examples of programming in GIS, getting accounts set up, getting up to speed with Postgres.	
Wednesday, August 31, 2015	Nature Conservancy overview Get spun up on QGIS, Postgres, and PostGIS Sign on to Udemy account GIS lifecycle, spatial concepts in indexing, parallel processing, and field experiences. Spatial SQL: A language for Geographers	
Monday, September 05, 2015	No Class – Labor Day	
Wednesday, September 07, 2015	Spatial SQL: A Language for Geographers – Sections I, II, and III	

Monday, September 12, 2015	Spatial SQL: A Language for Geographers – Section IV	
Wednesday, September 14, 2015	Spatial SQL: A Language for Geographers – Section V	
Monday, September 19, 2015	Quiz #1: Traditional SQL queries Class discussion – <i>Denton work project</i>	
Wednesday, September 21, 2015	Spatial SQL: A Language for Geographers – Section VI	
Monday, September 26, 2015	Spatial SQL: A Language for Geographers – Section VII, Python and SQL – complete distance decay application, big data query with indexes.	http://pythonhosted.org/psycogp2/
Wednesday, September 28, 2015	Quiz #2: Spatial SQL Statements Discuss quiz results Class discussion – <i>optimizing queries</i>	
Monday, October 03, 2015	Quiz #3: Emergency response in SQL	
Wednesday, October 05, 2015	Quiz #4: Richland Chemical in SQL Class discussion – <i>ARC/INFO functions in SQL</i>	
Monday, October 10, 2015	Class discussion – <i>geocoder and PostGIS</i>	https://pypi.python.org/pypi/geocoder#downloads
Wednesday, October 12, 2015	Class discussion – <i>Huff Model for Retail Gravitation in SQL</i>	
Monday, October 17, 2015	Quiz #5: TBA Class discussion – <i>SQL for regression modeling preparation</i>	
Wednesday, October 19, 2015	Overview of Python (<i>refresher</i>)	
Monday, October 24, 2015	Introduction to Arcpy Class discussion – <i>python examples directory</i>	ESRI Virtual Campus: Basics of Python (for ArcGIS 10)
Wednesday, October 26, 2015	Describing objects with Arcpy Class discussion – <i>python examples directory</i>	ESRI Virtual Campus: Python Scripting for Map Automation in ArcGIS 10

Monday, October 31, 2015	Lembo away, Automating Arcpy scripts with lists	ESRI Virtual Campus: Python Scripting for Geoprocessing Workflows (for ArcGIS 10)
Wednesday, November 02, 2015	Lembo away, Arcpy and Microsoft Office – <i>pgsql-bat directory</i>	
Monday, November 07, 2015	Quiz #6: Richland Chemical in Arcpy	
Wednesday, November 09, 2015	Plotting results with pygal – distance decay	Pygal documentation
Monday, November 14, 2015	Plotting results with plot.ly – distance decay	Plot.ly documentation
Wednesday, November 16, 2015	Building your first dashboard - obesity	
Monday, November 21, 2015	Building your first dashboard, continued...	
Wednesday, November 23, 2015	No Class - Thanksgiving Break	
Monday, November 28, 2015	Class project	
Wednesday, November 30, 2015	Class project	
Monday, December 05, 2015	Class project	
Wednesday, December 07, 2015	Class project	