STEPHEN F. AUSTIN STATE UNIVERSITY

Arthur Temple College of Forestry and Agriculture
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Syllabus

GIS Programming (GIS 400.001, 400.010/GIS 500.001 500.002)

(Spring 2019)

Instructor: Dr. Yanli Zhang
Email: zhangy2@sfasu.edu
Office: Forestry 121
Phone: (936) 468-2157

Lecture Tuesday, Thursday 11:00am – 11:50am at Forestry 108
Lab Friday 9:00am-11:50am at Forestry 102
Office hours: Tuesday 1:00pm -3:30pm, Wednesday 8:30am-12:00pm, 1:00pm–5:00pm

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Class news/notices, lecture handouts and grades: All lecture handouts are available at D2L (https://d2l.sfasu.edu/). It is students' responsibility to print handouts before coming to class. Grades for quizzes, labs, and exams are all available at D2L as well. Please check D2L for course related news and notices.

Course Description: 3 semester hours. GIS Programming and customization is about writing computer programs to perform GIS application which is either task specific or unavailable elsewhere. This course is designed to introduce students the basic structure and capabilities of object oriented programming (OOP) in a GIS environment. On completion of this course students are expected to be able to: understand software engineering concepts, good programming methods and practices; use Python to automate data management, processing, analysis, and visualization, and understand ArcObjects. The goal of the course is to help students not only to be a GIS user, but also to be a GIS developer. *(No previous programming experience is assumed, but must be familiar with ArcGIS)*

Program Learning Outcomes:

A. Demonstrate understanding and competency of object oriented programming;
B. Demonstrate understanding and competency of Python programming language;
C. Demonstrate understanding and competency of GIS programming;

Student learning outcomes

Upon successful completion of the course, the student will:

A. Understand basic theory of object oriented programming (PLO A);
B. Be familiar with Python (PLO B)
C. Be familiar with GIS programming and understand ArcObjects (PLO B);
D. Have demonstrated competency in oral and written communication skills.

Textbook

Paul A. Zandbergen 2013, Python scripting for ArcGIS, ESRI Press, ISBN 978-1-58948-282-1 (optional)

Main course references

Python http://docs.python.org/tutorial/index.html
ESRI, http://desktop.arcgis.com/en/arcmap/latest/analyze/python/a-quick-tour-of-python.htm

Other potential Python references for first time programmer:

Jason R. Briggs, 2013, Python for Kids, a playful introduction to programming, No Starch Press, 978-1-59327-407-8

Al Sweigart, 2010, Invent Your Own Computer Games with Python, 2nd edition, 978-0-98210-601-3 (Free PDF available online)

David Beazley and Brian K. Jones, 2013, Python Cookbook, 3rd edition, , O'Reilly Press, 978-1-449-34037-7

Tentative course calendar

week	date	topic	Lab
1	1.22.2019	Syllabus and course overview	
	1.24.2019	Basic GIS customization	Lab 1, Python
2	1.29.2019	Python basics	
	1.31.2019	Python basics	Lab 2, Python
3	2.5.2019	Python basics	
	2.7.2019	Python basics	Lab 3, Python
4	2.12.2019	Python basics	
	2.14.2019	Python basics	Lab 4, Python
5	2.19.2019	Python basics	
	2.21.2019	Python basics	Continue lab 4
6	2.26.2019	Python basics	
	2.28.2019	Python basics	Lab 5, Python
7	3.5.2019	Python basics	
	3.7.2019	Python in GIS	Lab 6, Python
8	3.12.2019	Review for mid-term	
	3.14.2019	**Mid-term exam**	No lab
9	3.19.2019	**Spring Break**	
	3.21.2019	**Spring Break**	
10	3.26.2019	Python in GIS	
	3.28.2019	Python in GIS (AAG)	Lab 7, Python
11	4.2.2019	Python in GIS	
	4.4.2019	**Easter Holiday**	**Easter Holiday**
12	4.9.2019	Good programming practices, term project requirements	
	4.11.2019	Python in GIS	Lab 8, Python
13	4.16.2019	Python in GIS	
	4.18.2019	Python in GIS	Lab 9, Python
14	4.23.2019	Python in GIS	

	4.25.2019	Python in GIS	Lab 10, Python
15	4.30.2019	ArcObjects	
	5.2.2019	Web GIS and course review/term project	Term project
16	5.7.2019	Term project and presentation	
	5.9.2019	**Term project presentation**	

Course Requirements:

No previous programming experience is presumed. But students are expected to have had at least two GIS courses and have good knowledge and experience of ArcGIS.

There will be **one closed-book exam**, **ten labs (work individually),** and **a term project**. It will be required to give one short (10 minutes maximum) oral presentation about the term project and a report is also required.

Term Project:

The project is intended to provide a deeper understanding of GIS programming through experience. Undergraduate students will work individually or in groups of 2 on projects. Graduate students work individually. The project will take the form of Python program which incorporates at least several concepts (Python file handling, use of multiple variable types, use of at least one function, iteration, geoprocessing, map automation, etc.) that were introduced during the semester. The final Python script(s) should attempt to overcome a spatial data management, analysis, or presentation problem. *The project must be an original piece of work developed for this course.* Students are encouraged to freely discuss their project ideas with the instructor. During the last scheduled lecture period, students will present their project to the class. The presentations can be no longer than fifteen (15) minutes and should use PowerPoint. It should cover:

1. **Title**: i.e., main function.
2. **Purpose:** a brief description of the function(s), why the application is needed, the major problem it resolves, and the expected users and benefits.
3. **Test data**: input data
4. **Particular algorithm**: Describe any particular algorithms that is implemented (e.g., sorting, random number generator, etc).
5. **Code demonstration**: **demonstrate the function of the developed tool/command with input data, show the output(s).**

The presentation file, the ArcGIS mxd file with source code, test data, and a brief report (5-10 pages double spaced brief description of the tool/command) are due right after presentation.

Grading policy

MIDTERM EXAM		250
QUIZZES	(20 x 5)	100
TERM PROJECT		250
LAB ASSIGNMENTS	(40 x 10)	400
TOTAL POINTS		1000

Grading Scale:

A	900 – 1000	D	600 – 699

B	800 – 899	F	599 or less
C	700 – 799		

Questions regarding lab/homework/quiz/exam grading must be asked within one week after the lab/homework/quiz/exam is returned.

A class average will be computed and if warranted, a curve will be applied if the curve will result in a higher grade.

Class policy

1. Attendance and class participation are expected throughout the semester.
2. Complete all lab assignments on specified dates. Late assignment will lose 20% of the credit each day late.
3. All students submitting identical lab assignments (in whole or in part) will receive a grade of zero for that lab.
4. Complete term project report and give presentation on specified date. No credit for late work as it is the end of the semester.
5. Quizzes are to be taken during class. No make-up quizzes unless there is a valid university excuse (consult student handbook for guidelines).
6. Exams are to be taken during scheduled times. Make-up exams will be given to students with a valid university excuse (consult student handbook for guidelines).
7. There is no exception for the grading policy and the grading scale.

Course Grades Policy (5.5)

Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average. Please read the complete policy at http://www.sfasu.edu/policies/5.5_course-grades.pdf

Academic Integrity (*A-9.1*)

Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

Definition of Academic Dishonesty

Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete policy at http://www.sfasu.edu/policies/academic_integrity.asp

Withheld Grades *Semester Grades Policy (A-54)*
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

Students with Disabilities
To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

Responsible Use of Technology

It is expected that all students will only use cell phones, PDAs, laptop computers, MP3 players and other technology outside of class time or when appropriate in class. Answering a cell phone, texting, listening to music or using a laptop computer for matters unrelated to the course may be grounds for dismissal from class or other penalties.

Acceptable Student Behavior

Classroom behavior should not interfere with the instructor's ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy 10.4). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed. Please read the complete policy at http://www.sfasu.edu/policies/student-code-of-conduct_10.4.pdf

D2L

For D2L technical support, contact student support in the Office of Instructional Technology (OIT) at d2l@sfasu.edu or 936-468-1919. If you call after regular business hours or on a weekend, please leave a voicemail.

For general computer support (not related to D2L), contact the Technical Support Center (TSC) at 936-468-HELP (4357) or at helpdesk@sfasu.edu.

To learn more about using D2L, visit SFA ONLINE at http://sfaonline.sfasu.edu, where you'll find written instructions and video tutorials.

Syllabus Changes:

The instructor reserves the right to make changes as necessary to this syllabus.