Syllabus

GIS Programming (GIS 400.001, 400.010/GIS 500.001 500.002)  
(Spring 2020)

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  
Wednesday 3:00pm-5:50pmm at Forestry 102

Office hours:  
Tuesday 1:00pm -3:30pm, Wednesday 9:00am-12:00pm or appointment by email

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  

Main course references  
Python  http://docs.python.org/tutorial/index.html

Other potential Python references for first time programmer:

Al Sweigart, 2020, Invent Your Own Computer Games with Python, 2nd edition, 978-0-98210-601-3 (Free PDF available online)

Tentative course calendar

<table>
<thead>
<tr>
<th>week</th>
<th>date</th>
<th>topic</th>
<th>Lab (Wednesday)</th>
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<tbody>
<tr>
<td>1</td>
<td>1.16.2020</td>
<td>Syllabus and course overview</td>
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<tr>
<td>2</td>
<td>1.21.2020</td>
<td>Basic GIS customization</td>
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<td></td>
<td>1.23.2020</td>
<td>Python basics</td>
<td>Lab 1, Python</td>
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<td>3</td>
<td>1.28.2020</td>
<td>Python basics</td>
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<td>1.30.2020</td>
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<td>Lab 2, Python</td>
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<td>4</td>
<td>2.4.2020</td>
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<td>2.6.2020</td>
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<td>Lab 3, Python</td>
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<td>2.13.2020</td>
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<td>Lab 5, Python</td>
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<td>2.25.2020</td>
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<td>2.27.2020</td>
<td>Python basics</td>
<td>Lab 6, Python</td>
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<td>8</td>
<td>3.3.2020</td>
<td>Review for mid-term</td>
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<td>3.5.2020</td>
<td>Mid-term exam</td>
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<td>9</td>
<td>3.10.2020</td>
<td>Spring Break</td>
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<td>3.12.2020</td>
<td>Spring Break</td>
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<td>3.17.2020</td>
<td>Python in GIS</td>
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<td>3.19.2020</td>
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<td>Lab 7, Python</td>
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<td>11</td>
<td>3.24.2020</td>
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<td>3.26.2020</td>
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<td>Lab 8, Python</td>
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<td>12</td>
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<td>4.2.2020</td>
<td>Good programming practices, term project requirements</td>
<td>Lab 9, Python</td>
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<td>13</td>
<td>4.7.2020</td>
<td>Python in GIS</td>
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<td>4.9.2020</td>
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<td>14</td>
<td>4.14.2020</td>
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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.

Graduate students taking the class at the end of the course will develop two projects.

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.

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Grading policy

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<tr>
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<th>Points</th>
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<tr>
<td>MIDTERM EXAM</td>
<td>250</td>
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<tr>
<td>QUIZZES (20 x 5)</td>
<td>100</td>
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<tr>
<td>TERM PROJECT</td>
<td>250</td>
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<tr>
<td>LAB ASSIGNMENTS (40 x 10)</td>
<td>400</td>
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<tr>
<td><strong>TOTAL POINTS</strong></td>
<td>1000</td>
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Grading Scale:
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](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.