



South Dakota State University

GEOG 790, 3 Credits **Seminar: GIS Programming** Course Syllabus (Spring 2020)

Course Instructor: Dapeng Li, Ph.D., GISP
Meeting Time: Mon. 1:00 - 3:50 PM
Meeting Location: Wecota Hall, Room 014
Office Hours: Tue. & Wed. 1:00 - 3:00 PM (or by appointment)
Office & Phone: Wecota Hall 115D
Work Phone: 1-605-688-4620
Work Email: dapeng.li@sdstate.edu (primary contact)

Lab Section

There is NOT a SEPARATE lab section for this course. The lab portion of this course will immediately follow the day's lecture material within the three-hour class period in Wecota Hall 100. Students are strongly encouraged to install ArcGIS, ArcGIS Pro, git, and relevant Python IDEs (e.g., Visual Studio Code or PyCharm) on their own laptops and use their laptops in the classroom.

Course Description

Python programming has become a must for many GIS jobs (especially GIS Developer positions). This course aims to help students develop Python programming skills for GIS. Specifically, this course covers the following topics: Python basics, object-oriented programming (OOP), software development life cycle, GIS data processing, and popular GIS Python libraries in ArcGIS (ArcPy and ArcGIS Python library).

Course Prerequisites

GEOG 372: Introduction to GIS (or equivalent course/experience).

Instructional Methods

Lecture, discussion, lab exercises, assignments, training sessions, final project, presentation, and quizzes.

Course Schedule

Date	Lecture Topic	Readings	Lab
1/13	Course Overview & Introduction	Syllabus	Lab Overview & Training Session
1/20	MLK Day Holiday (No Class)	L Ch. 1 T Ch. 1	No Lab (Training Session)
1/27	Software Development, Data Types, and Expressions	L Ch. 2	Lab 1
2/3	Loops and Selection Statements	L Ch. 3	Lab 2
2/10	Strings and Text Files	L Ch. 4	Lab 3
2/17	Presidents' Day Holiday (No Class)	T Ch. 2	No Lab
2/24	Lists and Dictionaries	L Ch. 5	Lab 4
3/2	Design with Functions	L Ch. 6	Lab 5
3/9	Spring Break (No Class)	T Ch. 3	No Lab
3/16	Design with Classes	L Ch. 9	Lab 6
3/23	ArcPy Cursors: Search, Insert, and Update	T Ch. 3	Project Time
3/29	Final Project Proposal Due in D2L by 5:00 PM		
3/30	ArcPy Geometry Objects and Cursors	T Ch. 4	Project Time
4/6	AAG Conference (No Class)	TBA	No Lab
4/13	Creating a Script Tool	T Ch. 5	Project Time
4/20	Project Advising	TBA	Project Time
4/27	Project Advising	TBA	Project Time
4/28	Final project Due on 4/28 @ 5 pm		
5/7	Final Presentations (1:45 – 3:45 pm, Wecota Hall 014)		
Training Sessions			
1	1/13 ~ 1/26	Udacity: How to Use Git and GitHub (11 hours)	

Note: This schedule is subject to change. Other assignments may also be added throughout the semester. Please always check the newest syllabus in D2L.

Required Text

L: Lambert, K. A. (2018). *Fundamentals of Python: first programs* (2nd edition). Cengage Learning.

T: Toms, S. & O'Beirne, D. (2017). *ArcPy and ArcGIS - Second Edition: Automating ArcGIS for Desktop and ArcGIS Online with Python* (2nd edition). Packt Publishing.

Note: We will use the Cengage MindTap platform for the Lambert book. This platform includes the ebook and many other resources. Students will need to buy the Toms & O'Beirne book by themselves. Other readings may also be assigned and will be provided by the instructor.

Important Dates:

- January 13, Monday First day of class
- January 22, Wednesday Last day to drop or add and adjust final fees
- January 23, Thursday "W" grade begins
- March 9-13, Monday – Friday Spring Break (No Class)
- March 16, Monday First Half Spring Term ends

- April 6, Monday Last day to drop a course
- April 10-April 12, Friday – Sunday Easter Recess
- May 4-May 8**, Monday – Friday Final exams
- May 13, Wednesday Grades due by midnight

Overall Course Goals

Upon completion of this course, students will be able to:

1. Understand the fundamental concepts and principles of Python programming.
2. Develop a good understanding of the basic functionalities and potential applications of Python in GIS applications.
3. Master the basic principles of the design and implementation of Python programs.
4. Be able to apply the knowledge learned in the class and use Python and relevant libraries to implement a program for a specific GIS application.

Student Learning Outcomes

Knowledge Outcomes

Students will master the basic concepts and principles of Python programming and learn how to use Python and relevant libraries to design and implement a computer program for a specific real-world GIS application (or workflow).

Skills Outcomes

Students will develop specific skills and competencies in Python programming and learn to use Python in real-world GIS applications. Students will use the methods covered in the class to complete a final project. Other skill outcomes include: written communication, interpersonal communication, professional presentation, and planning and organization.

Grade Evaluation

Evaluation Components	Points (each)	Total Points	Percent Value
Participation	TBD	100	10%
Lab Assignments (6)	50	300	30%
Quizzes	TBD	100	10%
Final Project Presentation	100	100	10%
Final Project Paper	400	400	40%
Total		1000	100%

Course Grade Scale

Grade	Final weighted points
A	90-100
B	80-89
C	70-79
D	60-69
F	< 60

Course Policies

Weekly Lab Assignments: Students will need to accomplish six required lab assignments to reinforce the concepts covered in the lectures. Although class time has been allocated for each assignment, additional work may also be necessary. Lab assignments must be submitted electronically through GitHub on time. 10 points will be deducted each day for late submissions. The students are expected to memorize all the commands, procedures, and solutions they have used and develop their proficiency in Python programming.

Quizzes: This course has several quizzes. Each quiz could include true/false questions, multiple choice questions, and short answer questions. The questions come from the key points covered in the lecture. We will use the Cengage MindTap platform or D2L to do the quizzes.

Final Project: Students are expected to use what they have learned in the class to accomplish a final project. The project is about designing and implementing a program for a specific GIS application. The project must be original work. Thus, students are **STRONGLY** encouraged to discuss with the instructor and determine their topics as early as possible.

Specifically, the final project should include the following components:

1. A brief project proposal that includes introduction, data, system design, and expected results. It should be within 5 pages (including figures). Word count: 500 ~ 1,000.
2. A PowerPoint presentation (about 15 minutes) that summarizes the key steps in designing and implementing the program and the applications of the GIS program.
3. A final report that consists of title, introduction, data, system design, system implementation, results, discussion, and conclusion (within 20 pages (double-spaced); word count: 1,500 ~ 2,500).

More details on the final project will be provided during the semester. Please refer to the course calendar for specific due dates.

Class Participation: Students are strongly encouraged to participate in different activities in the class. The class participation credit is given based on class attendance and in-class/take home exercises/quizzes.

Lab Materials: Students will also need (at least) an 8 GB Flash Drive to store their lab and final project materials. All the data on the lab computers could be automatically wiped out when the computers are rebooted. **SAVE YOUR FILES!!!**

Make-up Policy: If a student misses a quiz, points can only be made up if the student has an excused absence. To be considered an excused absence, the student must contact the instructor with a legitimate excuse prior to the day of the quiz.

Classroom Policies:

- All cell phones need to be turned off during the class/lab.
- No recording (photos, audio, etc.) without permission.
- Using computers/smartphones to surf the internet or work on other tasks is not allowed.

ADA Statement:

Any student who feels s/he may need an accommodation based on the impact of a disability should contact Nancy Hartenhoff-Crooks (or successor) Coordinator of Disability Services (605-688-4504 or Fax, 605-688-4987) to privately discuss your specific needs. The Office of Disability Services is located in room 065 at the University Student Union.

Freedom in Learning Statement:

Students are responsible for learning the content of any course of study in which they are enrolled. Under Board of Regents and University policy, student academic performance shall be evaluated solely on an academic basis and students should be free to take reasoned exception to the data or views offered in any courses of study. Students who believe that an academic evaluation is unrelated to academic standards but is related instead to judgment of their personal opinion or conduct should first contact the instructor of the course. If the student remains unsatisfied, the student may contact the Department Head, Dean, or both, of the college which offers the class to initiate a review of the evaluation.

Student Academic Integrity and Appeals:

The university has a clear expectation for academic integrity and does not tolerate academic dishonesty. University Policy 2:4 sets forth the definitions of academic dishonesty, which includes but is not limited to, cheating, plagiarism, fabrication, facilitating academic dishonesty, misrepresentation, and other forms of dishonesty relating to academics. The policy and its procedures also set forth how charges of academic dishonesty are handled at the University. Academic Dishonesty is strictly proscribed and if found may result in student discipline up to and including dismissal from the University.

TurnItIn

All written assignments in D2L will be automatically submitted to TurnItIn for plagiarism detection. Students should make sure that the assignments are their original work before they submit them in D2L. Students should check the similarity score of their submitted documents to ensure that the assignments pass the test.