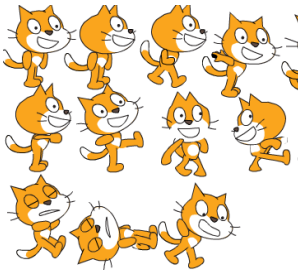
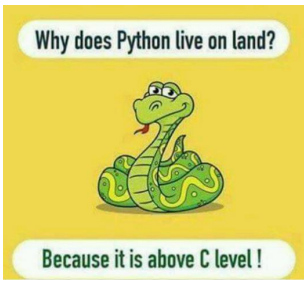
Programming Principles in GIS: Introduction to Programming & Python (GIS 321)

Lecturer: Susanna Werth Spring 2018, T/Th 10:30a-11:45a, COOR 191



```
def loadexact(ver):{...}
def _loadversion(ver, prefi
    targetname = prefix + v
    mainpackage = _original
        [targetname])
    global currentversion
    currentversion = getatt

    # Let users change vers
    currentversion.loadstab
    currentversion.loadunst
    currentversion.loadexac
```



Syllabus

Office Hours: on demand; after classes or by appointment
E-mail: swerth@asu.edu
Web: http://hydrogeodesylab.asu.edu

Course Description

This course introduces you literally from “Scratch” to programming in Python for GIS applications. The goal of this course is that students learn and understand various concepts of coding, learn how to code Python, get practice in using Python for coding projects and begin to learn how Python is useful in Geosciences and GIS.
Scratch is a visual online programming language that is used in education, art and many other disciplines for people of all ages. We will begin the semester with a creative Scratch project that will - depending on the student’s previous knowledge - introduce, refresh or deepen general concepts of coding. In the further weeks, students will be introduced to principles in programming and the Python coding language in the form of lectures and with coding assignments. We will work on incrementally growing coding projects to deepen the students coding practice. In the second half of the semester, we will also explore useful software packages for analyzing, displaying and presenting geo- and science data. The end of the semester will consist of a larger coding project, that is relevant and important to the student.

Course Goal

The goal of the course is to provide the student with sufficient fluency in the Python programming language, so that she/he is ready to address problems in Geography and Geosciences. During the semester, this goal will be approached through establishing the following abilities: First, knowledge about basic concepts in programming will be learned independent of the programming language used. Second and in parallel, the syntax of the coding language Python will be studied and practiced repeatedly on small coding problems. More advanced Python features and tools useful in Geosciences will be explored and practiced. Another emphasis will be made on self-learning and self-testing approaches. Lastly, the

students will gain the ability to design their own Python code and solve specific problems in Geography and/or Geosciences. At the end, the student will be prepared to use Python for GIS, hence, ready for the following course GIS322 on Spatial Data Structures and Algorithms including advanced GIS programming.

Courses Requirements

Students are expected to have a basic knowledge of Mathematics, Earth Science and reasonable computer literacy. Previous knowledge of coding is advantageous but not necessary.

Course Format

Most courses will be a combination of lectures and in-class exercises on slowly growing programming/coding problems. The second half of the semester will focus more on guided practice, code optimization and testing through examples of growingly complex coding problems and applications in Geography and Geosciences. Each week will include up to two assignments that repeat and manifest the learned content of the classes. A midterm exam will test the students gained knowledge on coding concepts and coding principles in Python. At the end of the semester a final exam will consist of a larger coding project. With the instructors guidance and advisory, each student will be responsible for his own coding project including presentation of his/her coding concept and data analysis results to the class.

Weekly Topics (subject to change)

Week	Date	Topic(s)
1	1/9, 11	Course information and introduction, getting ready for coding exercises
2	1/16, 18	What is code/-ing? What is a program?
3	1/23, 25	Python programs, Programming in Python, data structures
4	1/30, 2/1	Programming in Python: data structures, classes, files
5	2/6	Programming in Python: Sequences, Functions
	2/8	*Home assignment (lecturer at conference)*
6	2/13, 15	Programming in Python: object oriented programming
7	2/20, 22	Learn to help yourself, Code optimization
8	2/27	Code optimization II
	3/1	**Midterm Exam**
-	3/6,8	*Spring break*
9	3/13,15	Python packages numpy/scipy introduction
10	3/20,22	Package numpy/scipy: statistics
11	3/27,29	Package matplotlib: useful functions for plotting data
12	4/3, 5	Package matplotlib: getting practice, Python for GIS
13,14	4/10-19	**Final project** (in class practice, concept, coding, application, documentation, presentation)
15	4/24, 26	Final project presentations

Grading

Grading will be based on active participation in class, on performance in assignments and accomplishment of the final coding project. Final grades will base upon weighted average (for amount of work hours and importance) of the course components:

- in-class attendance and engagement (20%)
- performance during assignments and in-class exercises (30%; weighted average of all assignments)
- midterm exam (20%)
- final project (30%).

Assignments will be announced through blackboard. They are due at 11:59 on the day indicated in the course schedule. Late assignments will have a penalty of 10% for each day late. Assignments will not be accepted more than 5 days past the due date.

Course Grade	D	C	B-	B	B+	A-	A	A+
Percent Points	50-59	60-64	70-74	75-79	80-84	85-89	90-94	95+

Absence Policy

Attendance and participation are a critical component of this course. If you must miss a class, please let the instructor know in advance. Discussions and in-class practice cannot be made up and it is the students' responsibility to be familiar with the material they miss. More than three excused misses in total or any unexplained misses (that are not due to health emergencies) will result in a reduction of points for attendance (five percentage points per miss). In this regard, please also note the disability accommodations. Absences due to religious practice or university-sanctioned activities should be discussed with the instructor in advance.

Academic Integrity Policy

Academic honesty is expected of all students in all examinations, papers, laboratory work, academic transactions and records. The possible sanctions include, but are not limited to, appropriate grade penalties, course failure (indicated on the transcript as a grade of E), course failure due to academic dishonesty (indicated on the transcript as a grade of XE), loss of registration privileges, disqualification and dismissal. For more information, see http://provost.asu.edu/academicintegrity.

Cellular phones and pagers

… should be turned silent during the class and may only be used for class related investigations during exercises.

Disability Accommodations

Qualified students with disabilities who will require disability accommodations in this class are encouraged to make their requests to me at the beginning of the semester either during office hours or by appointment. Note: Prior to receiving disability accommodations, verification of eligibility from the Disability Resource Center (DRC) is required. Disability information is confidential.

The information in this syllabus, other than grade and absence policies, may be subject to change with reasonable advance notice.

Syllabus Acknowledgement Form

Course: Introduction into Programming and Python, GIS 321, Spring 2018, T/Th 10:30a-11:45a
Lecturer: Susanna Werth

Hereby, I acknowledge that I have fully read and understood the Syllabus of the above listed course.

Name:

Signature: