UF | UNIVERSITY of FLORIDA

**GIS Programming and Customization
GIS 6103 - Fall 2022**

**School of Forest, Fisheries, and
Geomatics Sciences (SFFGS)**
Geomatics Program

GIS 6103 - GIS Programming and Customization

1. OVERVIEW:
This hands-on graduate course provides a basic understanding of how to enhance and automate functional capabilities of a Geographic Information System (GIS) through Python scripting. Exercises and examples will use geospatial analysis tools from within the ArcGIS Pro environment and a variety of Python libraries to extend the range of operations for GIS analysis.

- Fall semester, 3 credits
- 100% online, synchronous and asynchronous component
- http://elearning.ufl.edu/
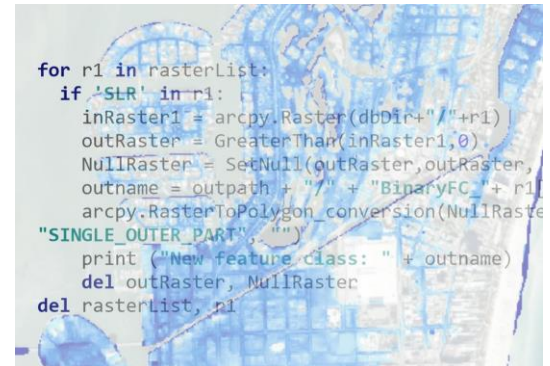
Course prerequisites: While there are no formal course prerequisites, this class assumes that students have a basic knowledge of ArcGIS Pro. Previous programming experience with any language (e.g. in Python, Visual Basic, R, C, Java, or JavaScript) will be helpful.

Instructor: Dr. Hartwig Henry Hochmair, Ft. Lauderdale Research & Education Center (FLREC),
phone: (954) 577-6317; e-mail: hhhochmair@ufl.edu

- Please use the Canvas message/Inbox feature for fastest response

Teaching assistant: Innocensia Owuor, Ft. Lauderdale Research & Education Center (FLREC); e-mail:
innocensia.owuor@ufl.edu

Lectures:
Fridays, 11:45am-2:30pm (per. 5-7) via Zoom; links to recordings are provided on the course website
First day of class: Fri, Aug 26; last day of class: Fri, Dec 2

Office hours:
Thursdays 5-7pm in Zoom. The instructor and TA can be best reached via e-mail in Canvas.

Required reading materials:
- No course book is required

Recommended reading materials:
- Zandbergen, P. A. (2020). Python Scripting for ArcGIS Pro. Redlands, CA: ESRI Press.

Further optional reading materials:
- Zandbergen, P. A. (2020). Advanced Python Scripting for ArcGIS Pro. Redlands, CA: ESRI Press.

Additional materials:
- ArcGIS Pro Python reference. Available at
https://pro.arcgis.com/en/pro-app/arcpy/main/arcgis-pro-arcpy-reference.htm
- ArcGIS Pro tool reference. Available at
https://pro.arcgis.com/en/pro-app/tool-reference/main/arcgis-pro-tool-reference.htm

Software requirements:
- ArcGIS Pro 3.0. Download and installation instructions are provided on under the Week 1 course module.
- PyCharm Community edition (current version: 2022.2); download at
https://www.jetbrains.com/pycharm/download/#section=windows

2. LEARNING OUTCOMES

The course objective is to provide students with the following competencies at the completion of the course:

1. Apply fundamental concepts of programming, such as loops and logical expressions
2. Use documentation of geoprocessing tools for program building
3. Embed programming libraries in Python code development for geoprocessing tasks
4. Automate vector and raster geoprocessing through Python
5. Create Python based geoprocessing tools

3. COURSE LOGISTICS

- For each assignment or discussion item a due date and time is given, which is the beginning of the next class (11:45am Friday).
- Assignments are graded based on timeliness, and completeness and correctness of code with written feedback by the instructor. The discussion item is a self-introduction and based on completeness and timeliness.
- There is a 1-week turnaround for assignment and discussion grading.
- This course is a distance education course taught as live lectures using the virtual classroom software Zoom. Lecture materials can be downloaded from weekly modules on the Canvas website.

The Canvas system should be used as the platform for written communication between students and the instructor. Questions and suggestions to the whole class can also be posted under the Discussions tab. Any short-term changes concerning lectures or other course components will be announced through Canvas. Feel free to call the instructors with any questions.

Technology Requirements:
- A computer or mobile device with high-speed internet connection and a headset and/or microphone and speakers to view lectures or join live sessions
- ArcGIS Pro runs only on Microsoft operating systems. Students using a Mac computer or other operating systems may consider using UF Apps (https://info.apps.ufl.edu/) instead which has ArcGIS Pro and PyCharm installed. Though this is an alternative, the instructor cannot provide any technical support when choosing that option.

- For Zoom: A supported web browser on a supported operating system (Windows, Mac OS, Linux); and minimum bandwidth. More details can be found here.

Using Zoom:

Live lectures and office hour meetings (per individual student requests) will be conducted with the Zoom conferencing software. Sessions can be joined by clicking a link posted by the instructor on Canvas.

Synchronous online sessions will be recorded. By sharing your video, screen, or audio during any synchronous online class sessions, you are consenting to being recorded for the benefit of students who cannot attend live as well as for class review during the current semester. If you have special circumstances or concerns about privacy, it is your responsibility to discuss it with your instructor.

Grades:

Item	Percentage
Timeliness and completeness of assignments (11 assignments @ 8.8% each)	97%
Online self-introduction	3%
Total	**100%**

Grading scale:

Grade	Percentage	Grade	Percentage
A	92.0-100.0	C+	78.0-79.9
A-	90.0-91.9	C	72.0-77.9
B+	88.0-89.9	C-	70.0-71.9
B	82.0-87.9	D	60.0-69.9
B-	80.0-81.9	E	0-59.9

For information on current UF policies for assigning grade points, see
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

4. COURSE CONTENT

Week	Topic	Readings
Week 1, Aug 26	Introduction to Python and Python editors	Intro book ch. 1-3
Week 2, Sep 2	Syntax, variables, control structures, objects	Intro book ch. 4.5, 4.23
Week 3, Sep 9	Data types, file handling	Intro book ch. 4.3-4.18, 8.7
Week 4, Sep 16	Intro to Arcpy and geoprocessing in Python	Intro book ch. 5
Week 5, Sep 23	Spatial data management	Intro book ch. 6
Week 6, Sep 30	Cursors: Feature selection and table manipulation	Intro book ch. 8
Week 7, Oct 7	Q&A session	
Week 8, Oct 14	Feature geometries	Intro book ch. 9
Week 9, Oct 21	Raster processing	Adv. book ch. 2
Week 10, Oct 28	Script tools	Adv. book ch. 3
Week 11, Nov 4	Jupyter notebook	Adv. book ch. 7, 9
Week 12, Nov 11	*Veterans Day (no class)*	
Week 13, Nov 18	Advanced python libraries for spatial analysis	Adv. book ch. 6
Week 13, Nov 25	*Thanksgiving (no class)*	
Week 14, Dec 2	Q&A session	

Grades and grade points:

For information on current UF policies for assigning grade points, see

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5. POLICIES AND REQUIREMENTS

This syllabus represents current plans and objectives for this course. As the semester progresses, changes may need to be made to accommodate timing, logistics, or to enhance learning. Such changes, communicated clearly, are not unusual and should be expected.

Late submissions and make-up requests:
It is the responsibility of the student to access on-line lectures and readings and to maintain satisfactory progress in the course.

- A 10% penalty per day will be applied to late assignments. A late submission on the due date results also in a 10% deduction.
- Assignments will not be accepted if handed in more than seven days after the due date.
- Online discussions cannot be completed past the deadline.
- Exceptions to the late policy are only allowed per university policy.

Computer or other hardware failures, except failure of the UF canvas system, will not excuse students for missing assignments. Any late submissions due to technical issues MUST be accompanied by the ticket number received from the Helpdesk when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request consideration.

For computer, software compatibility, or access problems call the HELP DESK phone number—352-392-HELP = 352-392-4357 (option 2).

Semester Evaluation Process:
Student assessment of instruction is an important part of efforts to improve teaching and learning.

At approximately the mid-point of the semester, the School of Forest Resources & Conservation will request anonymous feedback on student satisfaction on various aspects of this course. These surveys will be sent out through Canvas and are not required, but encouraged. This is not the UF Faculty Evaluation!

At the end of the semester, students are expected to provide UF with feedback on the quality of instruction in this course using a standard set of university and college criteria (UF Faculty Evaluations). These evaluations are conducted online at https://evaluations.ufl.edu. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results.

Netiquette: Communication Courtesy Semester Evaluation Process:
All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats, as laid out in the UF Netiquette Guide for Online Courses. Failure to do so may result in loss of participation points and/or referral to the Dean of Students' Office.

Academic Honesty Policy:
As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "*We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.*"

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: "*On my honor, I have neither given nor received unauthorized aid in doing this assignment.*"

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct or appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated.

Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information

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regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code
View this video for more information on how to avoid plagiarism.

University Policy on Accommodating Students with Disabilities:
Students requesting accommodation for disabilities need to request an accommodation letter from https://disability.ufl.edu/. The student then needs to provide this documentation to the instructor when requesting accommodation. Students need to submit this documentation prior to submitting assignments. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

Software use:
All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Lecture recordings:
All live lectures and Q&A sessions will be recorded and made available via Canvas. Policies regarding student in-class recordings are detailed here http://aa.ufl.edu/policies/in-class-recording/.

6. CAMPUS RESOURCES
Academic Resources:
- For issues with technical difficulties for e-learning in Canvas, please post your question to the Technical Help Discussion in your course, or contact the UF Help Desk at:
  Learning-support@ufl.edu | (352) 392-HELP - select option 2 | http://elearning.ufl.edu | https://helpdesk.ufl.edu/
- SFFGS Academic Hub https://ufl.instructure.com/courses/303721
- Career Connections Center: Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.
- Library Support: Various ways to receive assistance with respect to using the libraries or finding resources.
- Teaching Center: Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring.
- Writing Studio: 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.
- Student Complaints On-Campus: Visit the Student Honor Code and Student Conduct Code webpage for more information.
- On-Line Students Complaints: View the Distance Learning Student Complaint Process.

Health and Wellness:
- *U Matter, We Care*: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit U Matter, We Care website to refer or report a concern and a team member will reach out to the student in distress.
- *Counseling and Wellness Center*: Visit the Counseling and Wellness Center website or call 352-392-1575 for information on crisis services as well as non-crisis services.
- *Student Health Care Center*: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the Student Health Care Center website.
- *University Police Department*: Visit UF Police Department website or call 352-392-1111 (or 9-1-1 for emergencies).

- Career Resource Center http://www.crc.ufl.edu/
- GatorWell Health Promotion Services https://gatorwell.ufsa.ufl.edu/