Course Syllabus

GIS Programming - GIS 4102c / GEO 6938

Office Hours: Hit me up on GroupMe. Also, you can book an appointment on Canvas Calendars so we can set up a Zoom meeting.

Course Description

Many professional, advanced students, and researchers often get very familiar with GIS and geographic concepts without ever working with a programming language. Often we work through Graphic User interfaces (GUI), but at some point, we often need to extend the capabilities, automate processes, or just work more efficiently to complete our primary goals to answer spatially based questions. In order to do this, we must use scripting. This course is designed to introduce you to the world of sprinting in GIS, so you can incorporate them into your workflow.

There are two primary goals for this course. First, students will learn introductory computer programming concepts and features. Students will deconstruct examples from a variety of programming and scripting languages (for example Python, R, javascript, API, and IDL), learning how to identify common logic, flow control, and syntactic features. Students will learn the purpose of these structures and how to start using the programming and scripting environments of common statistics, geographic information systems (GIS) and remote sensing (RS) platforms.

Second, students will learn how to use programming language, (i.e. Python), for scripting and geoprocessing applications. For example, students will learn algorithmic operations, implement basic programmatic concepts, load and manipulate data of different types, generate graphical output and create productive workflows. Students will then integrate these methods with GIS and advanced geoprocessing workflows via ArcGIS and the statistical processing environment, R. The primary outcome will be to facilitate students' use of programming and advanced geoprocessing via ArcGIS to analyze data of their own choosing on a final project. Students will present these methods to the class for others to critique, analyze and learn from. Code sharing and reuse are highly emphasized, as is in-and out-of-class collaboration.

Course Topics

Topics for the course are presented in the course modules of Canvas. We will work with Python in the ESRI environment, introduce Java, APIs, Earth Engine, Markup Languages, Web Programming, and others. The main goal is to get the student beyond working with a single language and learn more about the general approach os scripting and be able to use that with documentation to perform scripting in multiple environments.

Prerequisites

There are no formal prerequisites for this course, however, a basic statistical methods course (e.g. GEO3162C/GEO6160) and familiarity with ArcGIS (e.g. GEO3043/GEO5107C), either taken previously or concurrently will be greatly beneficial.

Course Resources

There is no required text for this course. All course material will be provided on the eLearning Platform (Canvas).

Optional Textbook: Zandbergen, P. A. (2013). *Python scripting for ArcGIS*. Esri press. https://www.esri.com/training/catalog/576605fb51de57f1099310ff/python-scripting-for-arcgis/

Class Meetings

In general, programming concepts and theory will be presented in a one-hour lecture. During the remaining two hours per week in-lab time, practical examples will be discussed and lab exercises will be conducted. Learning to program is often difficult and weekly labs are reserved for in-class work and one-on-one instruction.

Grading

Grades are assigned with the standard University breakdown. All labs/projects will be graded on a scale of 10. Grades will be averaged based on their category this breakdown for final grade:

- Labs: 60%
- Final Project: 30%
- Exam: 10%

Academic Honesty

You are all bound by the student academic honor code:

> "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity." "On my honor, I have neither given nor received unauthorized aid in doing this assignment."

Despite the course emphasis on code-reuse and collaboration, the final work you hand in for labs and for exams MUST be your own work or clearly

cited as not your own. Do not plagiarize code or material. The first time a student is caught cheating they will get a zero on the lab/test. On the second offense, the student will be reported to the appropriate student body.

UF Counseling Services

Resources are available on campus for students having personal problems or lacking clear career and academic goals that interfere with their academic performance. These resources are available on campus for students having personal problems or lacking clear career and academic goals that interfere with their academic performance. These resources include University Counseling Center, 301 Peabody Hall, 392-1575 (personal and career counseling); Student Mental Health, Student Health Care Center, 392-1171 (personal counseling); Center for Sexual Assault /Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161 ext. 4231 (counseling related to sexual assault and abuse); Career Resource Center, Reitz Union, 392-1601 (career development assistance and counseling).

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.

Americans With Disabilities Act

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Student Services before bringing your request to the instructor.

Grade Cutoffs

100	A
99	A
98	A
97	A
96	A
95	A
94	A
93	A
92	A
91	A
90	A
89	B+
88	B+
87	B+
86	B+
85	B+
84	B
83	B
82	B
81	B
80	B
79	C+
78	C+
77	C+
76	C+
75	C+
74	C
73	C
72	C
71	C

70	C
69	D+
68	D+
67	D+
66	D+
65	D+
64	D
63	D
62	D
61	D
60	D
59	E
58	E
57	E
56	E
55	E
54	E
53	E
52	E
51	E
50	E
49	E
48	E
47	E
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21	E

20	E
19	E
18	E
17	E
16	E
15	E
14	E
13	E
12	E
11	E
10	E
9	E
8	E
7	E
6	E
5	E
4	E
3	E
2	E
1	E
0	E

Course Summary:

Date	Details	
Mon Jan 6, 2020	First Day of Classes (https://ufl.instructure.com/calendar?event_id=1306228&include_contexts=course_395184)	12am
Tue Jan 7, 2020	Anwar's Office Hours (https://ufl.instructure.com/appointment_groups/5773)	10am to Jan 10 at 11am
Wed Jan 8, 2020	Anwar's Office Hours (https://ufl.instructure.com/appointment_groups/5774)	1pm to Jan 9 at 3pm
Thu Jan 9, 2020	Anwar's Office Hours (https://ufl.instructure.com/appointment_groups/5777)	4pm to Jan 14 at 4pm
Fri Jan 10, 2020	Anwar's Office Hours (https://ufl.instructure.com/appointment_groups/5775)	1pm to 3pm
Sun Jan 12, 2020	ArcGIS Python window - Simple Python Lab (https://ufl.instructure.com/courses/395184/assignments/4081314)	due by 11:59pm
	ArcToolBox Quiz (https://ufl.instructure.com/courses/395184/assignments/4081307)	due by 11:59pm
	Hello World (BlueJ) - Simple Java Lab (https://ufl.instructure.com/courses/395184/assignments/4081335)	due by 11:59pm
	Intro to ToolBox (https://ufl.instructure.com/courses/395184/assignments/4081337)	due by 11:59pm
	Introduction Module Quiz (https://ufl.instructure.com/courses/395184/assignments/4081305)	due by 11:59pm
	Questionnaire (https://ufl.instructure.com/courses/395184/assignments/4081306)	due by 11:59pm
	Sign Up for Accounts	to do: 11:59pm
	Welcome to GIS Programming!	to do: 11:59pm
	GroupMe	to do: 11:59pm
Mon Jan 13, 2020	Anwar's Office Hours (https://ufl.instructure.com/appointment_groups/5779)	4pm to 4:30pm
Wed Jan 15, 2020	Anwar's Office Hours (https://ufl.instructure.com/appointment_groups/5778)	4pm to Jan 17 at 4pm

Date	Details	
Sun Jan 19, 2020	Getting Started with ModelBuilder (https://ufl.instructure.com/courses/395184/assignments/4081331)	due by 11:59pm
	ModelBuilder: Exporting Script (https://ufl.instructure.com/courses/395184/assignments/4081342)	due by 11:59pm
	ModelBuilder: Parameters (https://ufl.instructure.com/courses/395184/assignments/4081343)	due by 11:59pm
Mon Jan 20, 2020	Martin Luther King Jr. Day (https://ufl.instructure.com/calendar?event_id=1311195&include_contexts=course_395184)	12am
Sun Jan 26, 2020	Copy SHP to MDB (https://ufl.instructure.com/courses/395184/assignments/4081319)	due by 11:59pm
	Run a Geoprocessing tool - arcpy (https://ufl.instructure.com/courses/395184/assignments/4081348)	due by 11:59pm
	Simple Python Quiz (https://ufl.instructure.com/courses/395184/assignments/4081308)	due by 11:59pm
	Using Python Window (Part 2) (https://ufl.instructure.com/courses/395184/assignments/4081351)	due by 11:59pm
Sun Feb 2, 2020	Decision Structures (https://ufl.instructure.com/courses/395184/assignments/4081323)	due by 11:59pm
	GitHub (https://ufl.instructure.com/courses/395184/assignments/4081333)	due by 11:59pm
	Loops (https://ufl.instructure.com/courses/395184/assignments/4081340)	due by 11:59pm
Sun Feb 9, 2020	For Iterators in ModelBuilder (https://ufl.instructure.com/courses/395184/assignments/4081329)	due by 11:59pm
	For Loop in Arcpy (https://ufl.instructure.com/courses/395184/assignments/4081330)	due by 11:59pm
	List of Unique Attributes (https://ufl.instructure.com/courses/395184/assignments/4081339)	due by 11:59pm
	Smarter Python Quiz (https://ufl.instructure.com/courses/395184/assignments/4081309)	due by 11:59pm
Sun Feb 16, 2020	Challenge: Challenge: Temperature Converter (https://ufl.instructure.com/courses/395184/assignments/4081315)	due by 11:59pm
	Challenge: Creating a Stand Alone Script (https://ufl.instructure.com/courses/395184/assignments/4081316)	due by 11:59pm
	Challenge: Creating contours for the Fox Lake DEM (https://ufl.instructure.com/courses/395184/assignments/4081317)	due by 11:59pm
	Challenge: Sharing Tools (https://ufl.instructure.com/courses/395184/assignments/4081318)	due by 11:59pm
Sun Feb 23, 2020	Getting Started With PyQGIS Programming (https://ufl.instructure.com/courses/395184/assignments/4081332)	due by 11:59pm
	Running Process Algorithms with PyQGIS (https://ufl.instructure.com/courses/395184/assignments/4081349)	due by 11:59pm
Mon Mar 2, 2020	SPRING BREAK! (https://ufl.instructure.com/calendar?event_id=1311205&include_contexts=course_395184)	12am
Tue Mar 3, 2020	SPRING BREAK! (https://ufl.instructure.com/calendar?event_id=1311206&include_contexts=course_395184)	12am
Wed Mar 4, 2020	SPRING BREAK! (https://ufl.instructure.com/calendar?event_id=1311207&include_contexts=course_395184)	12am
Thu Mar 5, 2020	SPRING BREAK! (https://ufl.instructure.com/calendar?event_id=1311208&include_contexts=course_395184)	12am
Fri Mar 6, 2020	SPRING BREAK! (https://ufl.instructure.com/calendar?event_id=1311209&include_contexts=course_395184)	12am
Sun Mar 8, 2020	Adding a KML (https://ufl.instructure.com/courses/395184/assignments/4081311)	due by 11:59pm
	Adding Features (https://ufl.instructure.com/courses/395184/assignments/4081312)	due by 11:59pm
	Plot at Sensor Radiance (https://ufl.instructure.com/courses/395184/assignments/4081344)	due by 11:59pm
	Plot reflectance at several locations (https://ufl.instructure.com/courses/395184/assignments/4081345)	due by 11:59pm
	Search and Find Data (https://ufl.instructure.com/courses/395184/assignments/4081350)	due by 11:59pm

Date	Details	
Sun Mar 15, 2020	Adding Shp File (https://ufl.instructure.com/courses/395184/assignments/4081313)	due by 11:59pm
	Creating an ArcGIS Web Map (https://ufl.instructure.com/courses/395184/assignments/4081321)	due by 11:59pm
	Visualizing Imagery (https://ufl.instructure.com/courses/395184/assignments/4081352)	due by 11:59pm
	Visualizing SRTM (https://ufl.instructure.com/courses/395184/assignments/4081353)	due by 11:59pm
Sun Mar 22, 2020	Feature to Raster (https://ufl.instructure.com/courses/395184/assignments/4081325)	due by 11:59pm
	Global Snow Observatory (https://ufl.instructure.com/courses/395184/assignments/4081334)	due by 11:59pm
Sun Mar 29, 2020	Creating a Google Map (https://ufl.instructure.com/courses/395184/assignments/4081320)	due by 11:59pm
	Dark DEM Model (https://ufl.instructure.com/courses/395184/assignments/4081322)	due by 11:59pm
	Display a web map (Python ArcGIS API and SQL) (https://ufl.instructure.com/courses/395184/assignments/4081324)	due by 11:59pm
	HTML Warmup (https://ufl.instructure.com/courses/395184/assignments/4081336)	due by 11:59pm
Sun Apr 5, 2020	Java Hello World (https://ufl.instructure.com/courses/395184/assignments/4081338)	due by 11:59pm
Sun Apr 12, 2020	Final Project Proposal (https://ufl.instructure.com/courses/395184/assignments/4081327)	due by 11:59pm
	Pseudocode for your final project (https://ufl.instructure.com/courses/395184/assignments/4081346)	due by 11:59pm
Sun Apr 19, 2020	Conceptual Exam (https://ufl.instructure.com/courses/395184/assignments/4081310)	due by 11:59pm
Wed Apr 22, 2020	Course Evaluation (https://ufl.instructure.com/courses/395184/assignments/4081304)	due by 11:59pm
Sun Apr 26, 2020	Final Project Presentation (https://ufl.instructure.com/courses/395184/assignments/4081326)	due by 11:59pm
Fri May 1, 2020	All work DUE!!!!! (https://ufl.instructure.com/calendar?event_id=1306202&include_contexts=course_395184)	12am
	Final Project Writeup (https://ufl.instructure.com/courses/395184/assignments/4081328)	due by 11:59pm
Mon May 4, 2020	Grades Submitted at noon (https://ufl.instructure.com/calendar?event_id=1306201&include_contexts=course_395184)	12am
	Machine Learning (https://ufl.instructure.com/courses/395184/assignments/4081341)	
	R and ArcGIS Pro (https://ufl.instructure.com/courses/395184/assignments/4081347)	