

# Course Syllabus

## GIS Programming - GIS 4102c / GEO 6938

**Office Hours:** Book office hours at <https://calendly.com/sounny/meetme>  
(<https://calendly.com/sounny/meetme>)

***In-Person attendance to class is optional. All Lectures and activities are done via canvas.***

### 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 scripting 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 of 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).

## **Class Meetings**

This course takes a studio approach to learning, in that class time is meant to work and interact with peers and the instructor. Any lectures given will be short and recording provided via canvas.

## **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 the 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
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10	E
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8	E
7	E
6	E
5	E
4	E
3	E
2	E
1	E
0	E

## Course Summary:











Date	Details	Due
Wed Aug 24, 2022	 <b>First Day of Class</b> <a href="https://ufl.instructure.com/calendar?event_id=2590854&amp;include_contexts=course_463193">https://ufl.instructure.com/calendar?event_id=2590854&amp;include_contexts=course_463193</a>	12am
Wed Aug 31, 2022	 <b>ArcGIS Python window - Simple Python Lab</b> <a href="https://ufl.instructure.com/courses/463193/assignments/5366099">https://ufl.instructure.com/courses/463193/assignments/5366099</a>	due by 11:59pm
	 <b>ArcToolBox Quiz</b> <a href="https://ufl.instructure.com/courses/463193/assignments/5366092">https://ufl.instructure.com/courses/463193/assignments/5366092</a>	due by 11:59pm
	 <b>GitHub</b> <a href="https://ufl.instructure.com/courses/463193/assignments/5366119">https://ufl.instructure.com/courses/463193/assignments/5366119</a>	due by 11:59pm
	 <b>Hello World (BlueJ) - Simple Java Lab</b> <a href="https://ufl.instructure.com/courses/463193/assignments/5366122">https://ufl.instructure.com/courses/463193/assignments/5366122</a>	due by 11:59pm
	 <b>Intro to ToolBox</b> <a href="https://ufl.instructure.com/courses/463193/assignments/5366124">https://ufl.instructure.com/courses/463193/assignments/5366124</a>	due by 11:59pm
	 <b>Introduction Module Quiz</b> <a href="https://ufl.instructure.com/courses/463193/assignments/5366094">https://ufl.instructure.com/courses/463193/assignments/5366094</a>	due by 11:59pm

Date	Details	Due
	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366093">Questionnaire</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366093">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366093">https://ufl.instructure.com/courses/463193/assignments/5366093</a>)</a>	due by 11:59pm
	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366095">Simple Python Quiz</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366095">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366095">https://ufl.instructure.com/courses/463193/assignments/5366095</a>)</a>	due by 11:59pm
	 <a href="#">GroupMe</a>	to do: 11:59pm
	 <a href="#">Sign Up for Accounts</a>	to do: 11:59pm
	 <a href="#">Welcome to GIS Programming!</a>	to do: 11:59pm
Mon Sep 5, 2022	 <a href="https://ufl.instructure.com/calendar?event_id=2590851&amp;include_contexts=course_463193">Labor Day</a> <a href="https://ufl.instructure.com/calendar?event_id=2590851&amp;include_contexts=course_463193">(<a href="https://ufl.instructure.com/calendar?event_id=2590851&amp;include_contexts=course_463193">https://ufl.instructure.com/calendar?event_id=2590851&amp;include_contexts=course_463193</a>)</a>	12am
Wed Sep 7, 2022	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366110">ESRI: Building Geoprocessing Models</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366110">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366110">https://ufl.instructure.com/courses/463193/assignments/5366110</a>)</a>	due by 11:59pm
	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366121">Hello Notebook!</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366121">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366121">https://ufl.instructure.com/courses/463193/assignments/5366121</a>)</a>	due by 11:59pm
	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366108">Decision Structures</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366108">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366108">https://ufl.instructure.com/courses/463193/assignments/5366108</a>)</a>	due by 11:59pm
	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366116">For Iterators in ModelBuilder</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366116">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366116">https://ufl.instructure.com/courses/463193/assignments/5366116</a>)</a>	due by 11:59pm
Wed Sep 14, 2022	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366117">For Loop in Arcpy</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366117">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366117">https://ufl.instructure.com/courses/463193/assignments/5366117</a>)</a>	due by 11:59pm
	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366126">List of Unique Attributes</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366126">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366126">https://ufl.instructure.com/courses/463193/assignments/5366126</a>)</a>	due by 11:59pm
	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366127">Loops</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366127">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366127">https://ufl.instructure.com/courses/463193/assignments/5366127</a>)</a>	due by 11:59pm
	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366096">Smarter Python Quiz</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366096">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366096">https://ufl.instructure.com/courses/463193/assignments/5366096</a>)</a>	due by 11:59pm

Date	Details	Due
Wed Sep 21, 2022	 <a href="#">Challenge: Challenge: Temperature Converter</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366101">https://ufl.instructure.com/courses/463193/assignments/5366101</a>	due by 11:59pm
Wed Sep 21, 2022	 <a href="#">Challenge: Creating a Stand Alone Script</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366102">https://ufl.instructure.com/courses/463193/assignments/5366102</a>	due by 11:59pm
Wed Sep 21, 2022	 <a href="#">Challenge: Sharing Tools</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366104">https://ufl.instructure.com/courses/463193/assignments/5366104</a>	due by 11:59pm
Wed Sep 28, 2022	 <a href="#">Plot reflectance at several locations</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366130">https://ufl.instructure.com/courses/463193/assignments/5366130</a>	due by 11:59pm
Wed Sep 28, 2022	 <a href="#">Running Process Algorithms with PyQGIS (revise it)</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366133">https://ufl.instructure.com/courses/463193/assignments/5366133</a>	due by 11:59pm
Wed Sep 28, 2022	 <a href="#">Search and Find Data</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366134">https://ufl.instructure.com/courses/463193/assignments/5366134</a>	due by 11:59pm
Wed Oct 5, 2022	 <a href="#">Challenge: Creating contours for the Fox Lake DEM</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366103">https://ufl.instructure.com/courses/463193/assignments/5366103</a>	due by 11:59pm
Wed Oct 5, 2022	 <a href="#">Getting Started With PyQGIS Programming</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366118">https://ufl.instructure.com/courses/463193/assignments/5366118</a>	due by 11:59pm
Wed Oct 5, 2022	 <a href="#">Plot at Sensor Radiance</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366129">https://ufl.instructure.com/courses/463193/assignments/5366129</a>	due by 11:59pm
Fri Oct 7, 2022	 <a href="#">Homecoming</a> <a href="https://ufl.instructure.com/calendar?event_id=2597900&amp;include_contexts=course_463193">https://ufl.instructure.com/calendar?event_id=2597900&amp;include_contexts=course_463193</a>	12am
Wed Oct 12, 2022	 <a href="#">Visualizing Imagery</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366135">https://ufl.instructure.com/courses/463193/assignments/5366135</a>	due by 11:59pm
Wed Oct 12, 2022	 <a href="#">Visualizing SRTM</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366136">https://ufl.instructure.com/courses/463193/assignments/5366136</a>	due by 11:59pm



Date	Details	Due
Wed Oct 19, 2022	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366112">Feature to Raster</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366112">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366112">https://ufl.instructure.com/courses/463193/assignments/5366112</a>)</a>	due by 11:59pm
	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366120">Global Snow Observatory</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366120">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366120">https://ufl.instructure.com/courses/463193/assignments/5366120</a>)</a>	due by 11:59pm
	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366105">Creating a Google Map</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366105">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366105">https://ufl.instructure.com/courses/463193/assignments/5366105</a>)</a>	due by 11:59pm
Wed Oct 26, 2022	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366106">Creating an ArcGIS Web Map</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366106">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366106">https://ufl.instructure.com/courses/463193/assignments/5366106</a>)</a>	due by 11:59pm
	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366123">HTML Warmup</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366123">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366123">https://ufl.instructure.com/courses/463193/assignments/5366123</a>)</a>	due by 11:59pm
	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366107">Dark DEM Model</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366107">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366107">https://ufl.instructure.com/courses/463193/assignments/5366107</a>)</a>	due by 11:59pm
Wed Nov 2, 2022	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366109">Display a web map (Python ArcGIS API and SQL)</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366109">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366109">https://ufl.instructure.com/courses/463193/assignments/5366109</a>)</a>	due by 11:59pm
Wed Nov 9, 2022	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366125">Java Hello World (Extra Credit)</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366125">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366125">https://ufl.instructure.com/courses/463193/assignments/5366125</a>)</a>	due by 11:59pm
Fri Nov 11, 2022	 <a href="https://ufl.instructure.com/calendar?event_id=2597901&amp;include_contexts=course_463193">Veterans Day</a> <a href="https://ufl.instructure.com/calendar?event_id=2597901&amp;include_contexts=course_463193">(<a href="https://ufl.instructure.com/calendar?event_id=2597901&amp;include_contexts=course_463193">https://ufl.instructure.com/calendar?event_id=2597901&amp;include_contexts=course_463193</a>)</a>	12am
	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366113">Final Project Presentation</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366113">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366113">https://ufl.instructure.com/courses/463193/assignments/5366113</a>)</a>	due by 11:59pm
	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366114">Final Project Proposal</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366114">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366114">https://ufl.instructure.com/courses/463193/assignments/5366114</a>)</a>	due by 11:59pm
Wed Nov 16, 2022	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366115">Final Project Writeup</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366115">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366115">https://ufl.instructure.com/courses/463193/assignments/5366115</a>)</a>	due by 11:59pm
	 <a href="https://ufl.instructure.com/courses/463193/assignments/5366131">Pseudocode for your final project</a> <a href="https://ufl.instructure.com/courses/463193/assignments/5366131">(<a href="https://ufl.instructure.com/courses/463193/assignments/5366131">https://ufl.instructure.com/courses/463193/assignments/5366131</a>)</a>	due by 11:59pm

Date	Details	Due
Wed Nov 23, 2022	 <b>No Class</b> <a href="https://ufl.instructure.com/calendar?event_id=2597905&amp;include_contexts=course_463193">https://ufl.instructure.com/calendar?event_id=2597905&amp;include_contexts=course_463193</a>	12am
Thu Nov 24, 2022	 <b>Thanksgiving</b> <a href="https://ufl.instructure.com/calendar?event_id=2590846&amp;include_contexts=course_463193">https://ufl.instructure.com/calendar?event_id=2590846&amp;include_contexts=course_463193</a>	12am
Wed Nov 30, 2022	 <b>Conceptual Exam</b> <a href="https://ufl.instructure.com/courses/463193/assignments/5366097">https://ufl.instructure.com/courses/463193/assignments/5366097</a>	due by 11:59pm
Wed Dec 7, 2022	 <b>All Work Due</b> <a href="https://ufl.instructure.com/calendar?event_id=2590850&amp;include_contexts=course_463193">https://ufl.instructure.com/calendar?event_id=2590850&amp;include_contexts=course_463193</a>	12am
Wed Dec 7, 2022	 <b>Last Day of Class</b> <a href="https://ufl.instructure.com/calendar?event_id=2590848&amp;include_contexts=course_463193">https://ufl.instructure.com/calendar?event_id=2590848&amp;include_contexts=course_463193</a>	12am
	 <b>Course Evaluation</b> <a href="https://ufl.instructure.com/courses/463193/assignments/5366098">https://ufl.instructure.com/courses/463193/assignments/5366098</a>	due by 11:59pm
	 <b>AutoCAD Batching</b> <a href="https://ufl.instructure.com/courses/463193/assignments/5366100">https://ufl.instructure.com/courses/463193/assignments/5366100</a>	
	 <b>Extra Credit on Peer Review and Participation</b> <a href="https://ufl.instructure.com/courses/463193/assignments/5366111">https://ufl.instructure.com/courses/463193/assignments/5366111</a>	
	 <b>Machine Learning (Extra Credit)</b> <a href="https://ufl.instructure.com/courses/463193/assignments/5366128">https://ufl.instructure.com/courses/463193/assignments/5366128</a>	
	 <b>R and ArcGIS Pro</b> <a href="https://ufl.instructure.com/courses/463193/assignments/5366132">https://ufl.instructure.com/courses/463193/assignments/5366132</a>	