

Catalog Course Description:

This course covers methods and techniques for automating geospatial modeling and analysis for urban planning by using visual models, computer programming, and custom-built applications and tools that utilize Geographic Information Systems (GIS) technology in the context of planning information systems

Course Objective & Program:

The objective of the course is to give students a basic understanding of the concepts and techniques for solving planning problems more efficiently through automation and customization of Planning Information Systems. The course will focus on planning applications development using computer programming and Geographic Information Systems technology. Students will be exposed to fundamental concepts of programming including typical programming operations such as logical expressions, conditional processing, repetitive actions, and table and file manipulations.

The integration of programming with the use of GIS software for problem solving will be emphasized throughout the course. Students will learn how to automate common manual GIS operations and develop custom GIS tools. User-program interaction will include basic elements of event programming.

Students will practice the acquired knowledge through computer programming assignments that include homework and a final project which focuses on the development of a complete application program.

As the conclusion of this course, students should be able to:

- Automate and customize GIS to solve planning problems.
- Develop planning applications using computer programming and GIS technology.
- Perform typical programming operations such as logical expressions, conditional processing, repetitive actions, and table and file manipulations.

Topical Outline

- Overview of information technology for planning and the need for automation
- GIS modeling using graphical modeling techniques (model builder)
- GIS modeling using programming - Introduction to GIS programming
- Insertion of GIS problem logic into the computer program
- Representing GIS information
- Controlling program flow
- GIS problem solving with efficient code
- Working with maps, layers, tables
- Automation of attribute and spatial queries
- Bringing it all together: application design and development

Prerequisite knowledge and Skills

The course requires prior basic knowledge of GIS which students will need to have previously acquired by taking the introductory GIS courses offered by the URP or other departments at University of Florida or elsewhere. Previous programming experience is preferred but not required. At present, the course will teach Model Builder and Python to develop custom GIS applications using ArcGIS. Basic working knowledge of ArcGIS is required.

Delivery Method / Course Format

The course is taught in the classroom in the University of Florida campus for the on-campus URP program, and online for the URP online degree. In both cases, all the course materials are provided on the e-Learning course website. For on-campus students, occasionally the instructor will teach the course via live HD video-conferencing. On-campus students are expected to attend as usual in the classroom.

Course Information:

Instructor:	Ilir Bejlari, Ph.D, Associate Professor; ilir@ufl.edu , 352-294-1489; ARCH #454 Office hours: TBD
Assistant:	TBD Office hours: TBD
Credits:	Three credits
Website:	On e-Learning system
On-campus class	Fridays, periods 2-4, 8:30am to 11:30am, room Arch 439
Field visits:	Not applicable

Required Materials:

Student enrolled in this course are required to obtain the following textbook, computer and software:

- **Text – Zandbergen, P. (2013). *Python scripting for ArcGIS*. Redlands, California 92373-8100: ESRI Press.** The text is a guide for experienced users of ArcGIS Desktop to get started with Python scripting without needed previous programming experience. Experience with other scripting or programming languages is helpful but not required.
- **Computer** – Student must have access to a 64-bit computer that can run the ESRI's ArcGIS software. Students are required to bring a laptop computer in the classroom to perform classroom practice exercises, follow tutorials and work on the final project.
- **Software** – Three software packages are required:
 - **ArcGIS Pro** - Request a free student copy at http://www.geoplan.ufl.edu/software/student_license.php
 - **PyCharm Community**– Download a free copy at <https://www.jetbrains.com/pycharm/download/#section=windows>
 - **Microsoft Office** – Request a free student copy at <http://www.it.ufl.edu/gatorcloud/free-software-downloads-office-365-proplus/>

Attendance Policy:

On Campus: Class attendance is mandatory and should be respected. If students must miss class for any reason, it is imperative that they make arrangements with the instructor to be excused prior to the class period. Two or more unexcused absences will result in a reduction of one grade point off the final grade. While in class, participation is required. Participation includes playing an active role during lectures and class discussions, and displaying equal engagement with team members during collaborative assignments.

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Online: While face-to-face attendance is not required, students need to make use of the various tools in e-learning system to develop a learning community. The discussion board is an area where students can communicate with the instructor and classmates regarding a variety of topics.

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:
<http://gradcatalog.ufl.edu/content.php?catoid=8&navoid=1493#attendance>

Expectations, Evaluation, & Grading:

The course objectives will be achieved through lectures, assignments, and a final class project. Evaluation and grading for the course have been broken into five parts, each having a weight in the final grade:

Assignments – 60%: Assignments are designed to build student’s knowledge and understanding of various aspect of GIS programming and its application to problem solving. Masterful understanding of the concepts throughout the course of the semester will contribute to the student’s success in this course. There will be four assignments, each given a calculated weight corresponding to the magnitude and difficulty of work required. Assignments will be graded as follows:

Assignment#	Weight
1	7%
2	13%
3	18%
4	22%
Total	60%

Final Project – 40%: Final project will focus on developing a complete GIS application program that addresses a planning problem. The project covers most of the class knowledge and skills and will be accomplished in several parts during the last month of the course.

Late Submissions: For assignments submitted late there will be a 10 points deduction for each day late for the first three days following the due date. The assignment will not be accepted if it’s four days late and a grade of 0(zero) will be issued. Exceptions could be made for extraordinary circumstances consistent with university policies (See link under Attendance Policy above).

University of Florida grading scale

Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	WF	I	NG	S-U
% Range	>93	90-92	87-89	83-86	80-82	77-79	73-76	70-72	67-69	63-66	60-62	<60				
Grade Point	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.33	1.0	.67	0	0	0	0	0

Non-Punitive Grades (not counted in GPA)

- W Withdrew
- U Unsatisfactory
- H Deferred
- N No grade reported

Failing Grades (counted in GPA)

- E Failure
- WF Withdrew failing
- NG No grade reported
- I Incomplete

Student Assistance and Communication:

Other than in the classroom or during office hours, the rest of the communication with the course faculty and assistant will take place within e-Learning. Any emails received outside the e-Learning system will not receive a response.

Help with homework and project assignments will be provided in classroom, during office hours as well as via email or through online communication as applicable. For interactive online assistance, we will use GoToMeeting. To use GoToMeeting, go to joingotomeeting.com and enter meeting ID **154-746-821**. After joining the meeting for the first time, you must switch to the desktop app before continuing (look for switch to desktop button). For audio, you can use computer microphone and speakers, or telephone. The use of a headset is recommended for best audio quality.

Academic Honesty:

Student Honor Code and Academic Honesty: Students must follow the University's policy regarding cheating and the use of copyrighted materials. Please consult the graduate catalog or visit <http://www.dso.ufl.edu/stg/> for more information.

Disabilities:

Accommodation for students with disabilities: Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

Spray Painting Policy (College of Design, Construction and Planning):

Spray painting, or the use of any other sort of aerosol spray, is not allowed in the Architecture Building, Rinker Hall and in Fine Arts C, except within the spray booth found in Room 211 of Fine Arts C. Students found in violation of this policy will be referred to the Dean of Students for disciplinary action.

References & Resources:

Web Resources

- <https://sites.google.com/site/stanfordgis2013/introduction-to-python-for-arcgis>
- <https://docs.python.org/2/tutorial/index.html>
- <https://arcpy.wordpress.com/>
- <http://learnpythonthehardway.org/book/>

UF Libraries and Labs

- Library homepage: <http://www.uflib.ufl.edu>
- Architecture & Fine Arts Library: <http://www.uflib.ufl.edu/afa/>
- Course Reserves: <https://ares.uflib.ufl.edu>
- Library Tools and Mobile Apps (smart phones, RSS feeds, etc.): <http://www.uflib.ufl.edu/tools>
- Architecture CIRCA computer lab: <https://labs.at.ufl.edu/architecture.php>

Tentative Course Schedule:

MODULE	SCHEDULE		TOPIC	ASSIGNMENTS	
	Campus	Online		Assigned	Due
Module 1	1/6	2/27	Intro to Model Builder	Homework 1	
Module 2	1/13	3/3	Intro to Python Programming	Homework 2	
Module 3	1/20	3/7	More Python on Lists and Loops		Homework 1
Module 4	1/27	3/11	Functions and Error Handling	Homework 3	Homework 2
Module 5	2/3	3/17	Intro to Arcpy		
Module 6	2/10	3/17	More Arcpy on Selection and Cursors		Homework 3
Module 7	2/17	3/22	Handling Rasters		
Module 8	2/24	3/26	Building Custom Tools	Homework 4	
Project	3/3	3/29	Project Work – Part 1: Develop Model	Project: Part1	Homework 4
	3/10	n/a	No class / Spring Break		
Project	3/17	4/4	Project Work - Part 2: Python Script	Project: Part2	Project: Part1
Project	3/24	4/9	Project Work - Part 2: Python Script		
Project	3/31	4/14	Project Work - Part 2: Python Script		
Project	4/7	4/18	Project Work - Part 3: Develop Tool	Prepare Presentation	Project: Part2
Project	4/14	4/22	Project Presentation		Project Presentation
Project	4/25	4/25	Final Materials Due		