AUTOMATION FOR GEOSPATIAL MODELING AND ANALYSIS

URP6271

3 CREDIT HOURS

SPRING 2019

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OFFICE HOURS: Fridays 11:30am to 1:00pm

COURSE TA OR COORDINATOR: TBD

COURSE WEBSITE:

All course materials are posted on the e-Learning website at http://lss.at.ufl.edu

COURSE COMMUNICATIONS:

Communication with the instructor and the assistant will occur via email through eLearning. Use UF email address only if you have an emergency and/or are unable to access the Canvas email.

REQUIRED TEXT: Students enrolled in this course are required to obtain the following textbook:

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.

ADDITIONAL RESOURCES:
Computer and Software

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

Computer – Student must have access to a 64-bit computer that can run the ESRI's ArcGIS software. Students are required to bring the computer to class to perform classroom practice exercises, follow tutorials, and work on the final project.

Software – The following software packages are required. Detailed instructions about obtaining and installing the software are provided in the eLearning class page.

- *ArcGIS Pro*
- *PyCharm Community*
- *Microsoft Office*

Web Resources

Dun General Web References

- *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 (links and web addresses to facilitate your access)

- *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*

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.

PREREQUISITE KNOWLEDGE AND SKILLS: The course requires prior basic knowledge of GIS, which students must have previously acquired by taking the introductory GIS courses offered by the URP, or other departments at University of Florida or other university. 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.

PURPOSE OF COURSE: The purpose 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 the development of planning applications 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.

COURSE GOALS AND/OR OBJECTIVES:

By the end of this course, students will 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.

HOW THIS COURSE RELATES TO THE STUDENT LEARNING OUTCOMES IN THE DEPARTMENT OF URBAN AND REGIONAL PLANNING:

This course is in line with the department's educational goal for students to apply knowledge to perform specific tasks required in the practice of planning. In addition, as a course in an area of specialization, it adds significantly to the basic knowledge, skills, and values of planning. **Automation for Geospatial Modeling and Analysis** addresses all of the objectives of the Information Technologies for Planning (ITP) specialization:

- Provide graduate planning students with the basic and advanced skills necessary to excel as a practicing planner that uses advanced information systems and technologies. This course is intended to teach skills in spatial analysis and urban modeling through automation in the context of planning information systems.
- Teach students to think critically about the use and function of advanced technologies within the planning profession and academy. Course assignments and project emphasizes the application of critical thinking skills to foster deep learning and facilitate "real-world" problem solving.
- Students are taught the techniques, methods, and concepts that are the foundation upon which they will excel in careers that advance planning analysis as a modern field of research and as a means of advancing their individual professional goals. Students level of comprehension and ability to apply methods are reflected in the required coursework produced by the students.

TEACHING PHILOSOPHY

It is important for Urban and Regional Planning students to develop critical thinking, problem solving, and data analysis skills to allow them to evaluate problems and propose solutions in the "real-world" arena they will soon be entering. In my class I use a combination of lecture and hands-on demonstrations to illustrate how the students can begin to apply the concepts to problem solving. Project-based learning through both individual or group assignments as well as a final project are another major component of my courses. These tasks challenge the students apply critical thinking skills to solve tangible planning problems using real-world data and scenarios. The skills acquired through the assignments build upon each other and all come together in a project that incorporates constraints one might encounter as a professional in the planning field. In the project, students are required to apply the concepts they have learned using various technical tools. Students are reviewed based on the ability to effectively communicate their ideas through oral and graphic presentation as well as creative application of technical skills using various applications covered in the course.

INSTRUCTIONAL METHODS:

The course objectives will be achieved through lectures, assignments, class discussions and a final project.

Assignments are designed to build student's knowledge and understanding of various aspect of automation 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.

The project will focus on developing a complete GIS model and tool that addresses an analytical planning problem. The project covers most of the class knowledge and skills and will be accomplished during several weeks.

All assignments, including the final project will have a weight in the final grade. Submitted assignments are required to meet scheduled deadlines and delivery dates. Assistance will be provided in and out of class.

COURSE POLICIES:

ATTENDANCE POLICY (ON CAMPUS STUDENTS ONLY):
Class attendance is required. It's understandable that students may have to miss the class occasionally for various good reasons. In such cases we require that they contact the instructor prior to the class to be excused from attendance. While in class, playing an active role during lectures and class discussions is encouraged.

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Consult relevant graduate or undergraduate catalogs at http://gradcatalog.ufl.edu/content.php?catoid=11&navoid=2486#attendance or https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

MAKE-UP POLICY: Student's with a valid reason will be allowed to present or submit assignments late. Students must present on the appointed time and must submit the assignments at the appointed time or a grade deduction will be enforced.

UF POLICIES:

UNIVERSITY POLICY ON ACCOMMODATING STUDENTS WITH DISABILITIES: Students requesting accommodation for disabilities must first register with the Dean of Students Office (http://www.dso.ufl.edu/drc/). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

UNIVERSITY POLICY ON ACADEMIC MISCONDUCT: Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Student Honor Code at http://www.dso.ufl.edu/students.php.

NETIQUETTE: COMMUNICATION COURTESY
All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats. Please see http://teach.ufl.edu/wp-content/uploads/2012/08/NetiquetteGuideforOnlineCourses.pdf .

GETTING HELP:

For technical difficulties with e-Learning please contact the UF Help Desk at:

- Learning-support@ufl.edu
- (352) 392-HELP - select option 2
- https://lss.at.ufl.edu/help.shtml

** Any requests for make-ups due to technical issues MUST be accompanied by the ticket number received from LSS 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 a make-up.

Other resources are available at http://www.distance.ufl.edu/getting-help for:

- Counseling and Wellness resources
- Disability resources
- Resources for handling student concerns and complaints
- Library Help Desk support

Should you have any complaints with your experience in this course please visit http://www.distance.ufl.edu/student-complaints to submit a complaint.

GRADING POLICIES:

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

I   Incomplete

Failing Grades (counted in GPA)

E   Failure

WF   Withdrew failing

NG   No grade reported

I   Incomplete

The assignments and the project will be graded in a scale of 0 to 100 and will be weighted as follows:

- Assignment 1: 7%
- Assignment 2: 13%
- Assignment 3: 18%
- Assignment 4: 22%
- Final project: 40%
  (Total: 100%)

Late Submissions: For assignments/project 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 after three 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).

TYPICAL COURSE SCHEDULE:

MODULE	TOPIC	ASSIGNMENTS (GIVEN/DUE)	
Module 1	Introduction to Model Builder	Homework 1	
Module 2	Introduction to Python Programming	Homework 2	
Module 3	More Python on Lists and Loops		Homework 1
Module 4	Functions and Error Handling	Homework 3	Homework 2
Module 5	Introduction to Arcpy		
Module 6	More Arcpy on Selection and Cursors		Homework 3
Module 7	Building Custom Tools	Homework 4	
Module 8	Handling Rasters		
Project	Project Work – Part 1: Develop Model	Project: Part1	Homework 4
Project	Project Work - Part 2: Python Script	Project: Part2	Project: Part1
Project	Project Work - Part 2: Python Script		
Project	Project Work - Part 2: Python Script		
Project	Project Work - Part 3: Develop Tool	Prepare Presentation	Project: Part2
Project	Project Presentation		Project Presentation
Project	Final Materials Due		