# Urban Spatial Analysis

#### URP6272

#### 3 Credit Hours

#### Spring 2019

Instructor: Paul Zwick, Ph.D.

Professor,

Department of Urban and Regional Planning,

School of Landscape Architecture and Planning

Room 431B Architecture Building,   
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352-294-1483

Office Hours: Campus office hours listed on office door, Online office hours by appointment.

Course TA/Coordinator: No TA for on campus course, online coordination Kyle Dost

Course Website: All materials are posted on the Canvas e-Learning University of Florida. The course may be accessed at: <http://lss.at.ufl.edu>

Course Communications: For on campus students in class or during office hours. For on line students email through canvas course communications for individual appointment.

Required Text: No required text. However for students that wish more detailed information or are having trouble with concepts for this course I recommend: ESRI Book Series at <https://esripress.esri.com/display/index.cfm>

1. [The ESRI Guide to GIS Analysis, Volume 1](https://esripress.esri.com/display/index.cfm?fuseaction=display&websiteID=22&moduleID=0)
2. [The ESRI Guide to GIS Analysis, Volume 2](https://esripress.esri.com/display/index.cfm?fuseaction=display&websiteID=86&moduleID=0)
3. [GIS and Cartographic Modeling](https://esripress.esri.com/display/index.cfm?fuseaction=display&websiteID=228&moduleID=0)
4. [GIS Tutorial 2](https://esripress.esri.com/display/index.cfm?fuseaction=display&websiteID=296&moduleID=0)
5. [The Esri Guide to GIS Analysis, Volume 3](https://esripress.esri.com/display/index.cfm?fuseaction=display&websiteID=215&moduleID=0)

Additional Resources: Software for individual licenses of ArcGIS version 10.5 for on campus use may be obtained by applying at <http://www.geoplan.ufl.edu/software/student_license.php> or students may use the UFApps ArcGIS installation of ArcGIS 10.5.

Course Description: *Theoretical and practical knowledge about spatial relationships as applied to urban form and the development and analysis of urban environments using geographic information systems and spatial analysis techniques such as spatial statistical modeling.*

Prerequisite Knowledge and Skills: Students taking this course must have taken **URP6271 Introduction to Planning Information Systems** **or an equivalent course** recognized by the course instructor (Dr. Paul Zwick).

Purpose of Course: *This course is intended to provide students with and understanding of Geostatistical analysis and spatial modeling techniques. The course also teaches students some basic GIS process modeling using the ArcGIS ModelBuilder environment. The course supports the department’s mission as part of the “Planning Information Technologies” specialization and builds advanced knowledge and skills within that specialization. The course provides analysis skills that allow planning students to achieve in the area of spatial statistical analysis as required for hypothesis testing, cluster and pattern analysis, and geospatial determinist and stochastic surface development, as well as, spatial predictive modeling. In addition effort has been made to include examples and assignments that provide opportunity to utilize statistical analysis as a problem solving/analysis methodology for urban and regional planning, planning decision making, disaster management analysis, and in support of conservation planning and sustainable development. For on campus presentation the class will be taught from lecture notes and assigned readings. Course lectures (the slides) will be provided in PDF format on the Canvas course site at e-Learning for UF (or by email) for every student registered in the course. Students will be able to access the PDF files for viewing during class and for download as a study aid for homework and examinations. For online presentation the course utilizes slides with audio visual discussion.*

Course Goals and/or Objectives: By the end of this course, students will:

* *Students in the course will demonstrate research and critical thinking skills reflecting comprehension with regard to the use of spatial modeling (both determinist and stochastic) for urban and regional planning.*
* *Students will analyze and combine qualitative and quantitative information from multiple sources to support decision-making using spatial statistical analysis.*
* *Students will apply knowledge of human settlement, historical and contemporary data, organizational and institutional data, and policy and processes relevant to urban and regional planning analysis.*
* *Students will understand professional ethics and responsibility for data analysis.*
* *Students will in class discuss ethical behavior, cultural sensitivity, teamwork, professional conduct and the importance of developing communication skills regarding presentations of statistical analysis techniques (visual, oral and written).*

How This Course Relates to the Student Learning Outcomes in the DEPARTMENT OF URBAN AND REGIONAL PLANNING: Students taking this course will: through lectures, reading assignments, homework, essays, a course oral presentation, a final paper, and class participation review spatial research, techniques, and methods using spatial statistics to solve urban and regional problems. Each student’s work will be reviewed based upon the department’s student learning outcomes as those relate to urban spatial analysis.

Teaching Philosophy: *I expect all graduate students should be able to accomplish the basic requirements for the course and attain a minimum “B” grad). I will not hesitate to mark lower when a student does not meet that expectation and adequately display an understanding of the materials presented. In order to attain an “A” grade requires performance that displays quality work, depth of knowledge, and the ability to synthesize of ideas into actions or solutions.*

*I will be happy to meet individually with any student during office hours or by appointment for additional discussion on concepts, techniques, or methodology presented in this course.*

Instructional Methods: The course will have weekly lectures (normally 2) presenting concepts, techniques and methods for urban spatial analysis. A number of homework assignments will test student’s understanding of the lecture presentations. Essays will require students to discuss in detail concepts and methods presented. A final presentation and paper is required. Each student’s presentation will require the student to explain his/her statistical analysis using language and discussion appropriate for a meeting with members of the general public. The paper will require the student to discuss the same statistical analysis used for the presentation but directed at professional practice, research, or for the academy.

## COURSE Policies:

Attendance Policy: Mandatory.

Make-up Policy: Student’s with a valid reason will be allowed to present homework or submit an essay late. Students must present on the appointed time and must submit the course paper at the appointed time or a grade deduction will be enforced.

## UF Policies:

**Academic Honesty**

*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* [*https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/*](https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/)

**Disabilities**

*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/*](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.*

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Netiquette: Communication Courtesy

All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats. [Describe what is expected and what will occur as a result of improper behavior] <http://teach.ufl.edu/docs/NetiquetteGuideforOnlineCourses.pdf>

## Getting Help:

*For issues with technical difficulties for E-learning in Sakai, please contact the UF Help Desk at:*

* [*Learning-support@ufl.edu*](mailto:Learning-support@ufl.edu)
* *(352) 392-HELP - select option 2*
* [*https://lss.at.ufl.edu/help.shtml*](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*](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*](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)*** ***Failing Grades (counted in GPA)***

W Withdrew E Failure

U Unsatisfactory WF Withdrew failing

H Deferred NG No grade reported

N No grade reported I Incomplete

I Incomplete

Grades will be determined from Homework assignments, essay assignments, final presentation, and final paper.

Homework:

Assignment Module #1 100 Points

Assignment Module #2 100 Points

Assignment Module #3 100 Points

Assignment Module #4 100 Points

Assignment Module #5 100 Points

Assignment Module #6 100 Points

## Course Schedule:

Module 1: Measuring Geographic Distribution

Mean Center

Median Center

Center Feature

Standard Distance

Directional Distribution

Collect Events

Module 2: Spatial Statistics Analyzing Patterns

Average Nearest Neighbor

Spatial Autocorrelation Moran’s I Index

High/Low Clustering Getis-Ord Gi\*

Collect Distance Band for Neighborhood Counts

Incremental Spatial Autocorrelation

Multi-distance Spatial Cluster Analysis

Generating Spatial Weights Matrix

Module 3: Mapping Clusters

Anselin Local Moran’s I Index

Hot Spots Getis-Ord Gi\*

Optimized Outlier Analysis

Optimized Hot Spots Analysis

Grouping Analysis

Module 4: Modeling Spatial Relationships

Ordinary Least Squares Regression

Exploratory Regression

Geographically Weighted Regression

Module 5: Geostatistical Exploration of Data

Histogram

Q-Q Plot

General Q-Q Plot

Voronoi Maps

Mean, Median, Mode, IQR, Entropy, Standard Deviation

Semivariogram

Module 6: Surface Modeling

Deterministic Modeling

Inverse Distance Weighted

Stochastic Modeling

Creating an Empirical Semivariogram

Ordinary Kriging Default Model

Ordinary Kriging Optimized Model

Ordinary Kriging Optimized Model with Trend Removal