GEOG 492/GEOS 520: Geoscience Statistical Methods (Spring 2021)

Instructor: Dr. Jun Yan
Time: TR 9:35am – 10:55am
Prerequisite: GISC 317 & GEOG 391 (B or better)
Course website: http://blackboard.wku.com/

Room: Online & Zoom
Office Hour: By appointment
E-mail: jun.yan@wku.edu

Required Text:

- Smith, Michael de, Michael Goodchild, and Paul Longley. Geospatial Analysis - A Comprehensive Guide: http://www.spatialanalysisonline.com/.

Optional Text:

- O'Sullivan, David and Unwin, David J., 2002, ***Geographic Information Analysis***. **1st Edition**. John Wiley & Sons, Inc, ISBN: 0-471-21176-1.

Supplemental Texts:

- Bailey, Trevor and Anthony Gatrell. 1996. *Interactive Spatial Data Analysis*. Prentice Hall.
- Haining, Robert. 2003. *Spatial Data Analysis: Theory and practice*. Cambridge University Press.
- Rogerson, Peter. 2001. *Statistical Methods for Geography*. SAGE Publications.
- Goodchild, Michael. 2004. *Spatially Integrated Social Science*. Oxford University Press.
- Fotheringham, Stewart, Chris Brunsdon, and Martin Charlton. *Geographically Weighted Regression: The analysis of spatially varying relationships*. John Wiley & Sons, Inc.
- Fotheringham, Stewart and Michael Wegener. 2000. *Spatial Models and GIS: New potential and new models*. Taylor & Francis.
- Miller, Harvey J. and Jiawei Han. 2001. *Geographic Data Mining and Knowledge Discovery*. Taylor & Francis.
- Openshaw, Stan and Robert. 2000. Abrahart. *GeoComputation*. Taylor & Francis.

Required Equipment and Materials
A Windows PC with Internet access
A portal hard drive/flash drive to back up your course files, data, exercises, and projects.

Course Description:
This course introduces a variety of geospatial quantitative methods commonly used in the fields of Geoscience. The goal of this course is to provide an overview of a wide range of statistical methods used in the analysis of geospatial data. The emphasis is on gaining insights into the overall framework for geospatial analysis and developing an understanding of the various concepts, rather than an in-depth technical construction of specific statistical techniques in geosciences. The methods are mainly discussed within the context of GIS technology. Students are required to complete several lab exercises and projects using GIS (e.g. ArcGIS Desktop) and statistical software.

Course Objectives:

1. Know the importance of generating useful information from raw data
2. Understand the basic concepts, principles, and process of conducting geospatial analysis
3. Know how to implement effectively a variety of geospatial quantitative methods within GIS context

Class Format and Policies:

The course format will be the combination of *class meetings* and *web-guided self studies* using WKU E-courses. Students are expected to use **http://blackboard.wku.edu/** regularly for available class materials and electronic submission of their exercises, assignments and projects. This class website contains lecture notes, assignments, other materials related to the course, student grades, and other pertinent information. The class meetings include the lecture and lab components. Lecture will focus on the conceptual basis of geospatial quantitative methods. Students should take notes during the lecture component of the class. The lab component provides students with opportunities to get familiar with how to fulfill specific methods in GIS and/or statistical packages. Note that many project assignments will require time outside of class to complete. Auditing of this course is not allowed.

Attendance:

Class attendance is required. Roll will be taken at the start of every class period. If a student enters class late it is his or her responsibility to see me at the end of the class period and make sure I have marked them as present. **Student who has absence record will have a 2-point deduction for each day that he/she misses.** The student is responsible for obtaining all lecture notes, materials, etc.

Grading:

The evaluation of your performance in this course will be derived from:

1) One exam (given in the 14th week) covering topics related to geospatial analysis.
2) The completion of all lab exercises and four projects.

Each student will earn points toward final grade according to the following schedule:

Item	Points
Essay Assignments	30
Projects (4)	60 (15 each)
Homework, exercises, and class participation	10

Grading will follow the below scale:

Average Score	Grade
90 – 100%	A
80 – 89.9%	B
70 – 79.9%	C
60 – 69.9%	D
< 60%	F

Make-up Exam:

Make-up exam will be given only for the following special circumstances: (1) a university-sponsored event, and (2) illness with a doctor's written excuse. Justifying documentation must be presented to (and accepted by) the instructor **BEFORE** the date of the exam.

GIS Lab Policies:

The GIS lab is available for use any time during the day when a class is not scheduled (schedule posted on lab door). Evening hours will be made available and announced as soon as the lab monitor schedule is finalized. The lab is only to be used, however, only for work related to GIS and remote sensing classes.

Work such as term papers for other classes should be done in one of the universities general computer labs (for locations, see http://stech.wku.edu/lablocations.html). Do not print papers for other classes or material downloaded from the Internet on the printer in the GIS lab. Food, drink and tobacco products are strictly prohibited from the lab to protect the university's investment in computer equipment and keep the facility looking nice. The lab is monitored with cameras to enhance security.

Course Withdrawal:
Students who find it necessary to withdraw completely from the university (WKU) or from this course should report to the Office of Registrar in Potter Hall to initiate **W**ithdrawal procedures before the last **W**ithdrawal date. Students who cease attending class without and official **W**ithdrawal will receive a **F**ailing grade.

Students with Disabilities:
In compliance with University policy, students with disabilities who require academic and/or auxiliary accommodations for this course must contact the Student Accessibility Resource Center located in Downing Student Union, room 1074 of the Student Success Center. The phone number is 270.745.5004. or email at sarc.connect@wku.edu. Please do not request accommodations directly from the professor or instructor without a letter of accommodation from The Student Accessibility Resource Center.

Other Policies:
The Department of Geography and Geology strictly adheres to university policies, procedures, and deadlines regarding student schedule changes. It is the sole responsibility of the student to meet all deadlines with regard to adding, dropping, or changing the status of a course. Only in exceptional cases will a deadline be waived. The Student Schedule Exception Form is used to initiate all waivers. This form requires a written description of the extenuating circumstances involved and the attachment of appropriate documentation. Poor academic performance, general malaise, or undocumented general stress factors are not considered as legitimate circumstance.

Western Kentucky University (WKU) is committed to supporting faculty, staff and students by upholding WKU's Title IX Sexual Misconduct/Assault Policy (#0.2070) at https://wku.edu/eoo/documents/titleix/wkutitleixpolicyandgrievanceprocedure.pdf and Discrimination and Harassment Policy (#0.2040) at https://wku.edu/policies/hr_policies/2040_discrimination_harassment_policy.pdf.

Under these policies, discrimination, harassment and/or sexual misconduct based on sex/gender are prohibited. If you experience an incident of sex/gender-based discrimination, harassment and/or sexual misconduct, you are encouraged to report it to the Title IX Coordinator, Andrea Anderson, 270-745-5398 or Title IX Investigators, Michael Crowe, 270-745-5429 or Joshua Hayes, 270-745-5121.

*Please note that while you may report an incident of sex/gender based discrimination, harassment and/or sexual misconduct to a faculty member, WKU faculty are "Responsible Employees" of the University and **MUST** report what you share to WKU's Title IX Coordinator or Title IX Investigator. If you would like to speak with someone who may be able to afford you confidentiality, you may contact WKU's Counseling and Testing Center at 270-745-3159*.

Tentative Course Outline: Subject to revision as conditions warrant.

Week	Date	Topic	Essay	Project
1	1/19, 1/21	Introduction	**Essay #1 assigned**	
2	1/26, 1/28	Pitfalls and potentials of geospatial data		
3	2/2, 2/4	Fundamentals: Geospatial analysis framework	**Essay #1 due**	**Project #1 assigned**
4	2/9, 2/11	Spatial Point pattern analysis	**Essay #2 assigned**	
5	2/16, 2/18	Spatial Point pattern analysis	**Essay #2 due**	**Project #1 due**
6	2/23, 2/25	Spatial autocorrelation	**Essay #3 assigned**	**Project #2 assigned**
7	3/2, 3/4	Spatial autocorrelation		
8	3/9, 3/11	Multivariate regression & exploratory regression		
9	3/16, 3/18	Geographically Weighted Regression (GWR)	**Essay #3 due**	**Project #2 due**
10	3/23, 3/15	Describing and analyzing fields	**Essay #4 assigned**	**Project #3 assigned**
11	3/30, 4/1	The statistics of fields		
12	4/6, 4/8	The statistics of fields	**Essay #4 due**	**Project #2 due**
13	4/13, 4/15	Multivariate methods	**Essay #5 assigned**	**Project #4 assigned**
14	4/20, 4/22	Multivariate methods		
15		**Exam week**	**Essay # 5 due**	**Project #4 due**