**Master of Science in Geographic Information Systems**
**College of Arts and Sciences**

**R Redlands**
UNIVERSITY OF

### GIS 616 – Statistics and Spatial Analysis
### Course Syllabus – January 2018

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| *Office Hours:* | *Monday and Wednesday 12:00 pm – 1:00pm or by appointment* |

## Course Description

This course will introduce fundamental methods used in quantitative geographic research. The emphasis will be on the statistical analysis of geographic data. It will provide students with a survey of commonly used statistic methods, including both descriptive and inferential statistics, and prepare them for more advanced topics in spatial statistics. Built on the essential statistical testing principles, a few spatial statistics will be introduced to analyze different kinds of geographic data, such as point and areal datasets.

## Course Learning Outcomes

This course will provide an introduction to fundamental quantitative methods used in geographic data analysis. By the end of the course, students are expected to acquire and improve the following skills:

1. Understand fundamental statistical theories and use of statistics in geographic data analysis (develops MS GIS Learning Outcome #1);

2. Master commonly used statistical methods and be able to provide appropriate interpretations of the results (develops MS GIS Learning Outcomes #2,3);

3. Be familiar with computer software to conduct statistical analyses including ArcGIS and SPSS (develops MS GIS Learning Outcome #4).

## Course Requirements

This is a two unit course, which means you are required to put in at least 90 hours of work to be successful in this class. You are expected to prepare for each lecture, participate in class discussion, complete your homework and lab assignments, and prepare for the two exams. You should plan to spend at least two hours preparing for each class meeting and one hour for homework assignment after each class,

and four hours per week on lab assignments, reviewing class materials, and studying for exams.

## Required Texts

Burt, J. E. and G. M. Barber. (2009). *Elementary Statistics for Geographers (Third Edition)*, New York: The Guilford Press.

## Optional Reference for Labs

Norusis, M.J. (2011). *SPSS 19.0 Guide to Data Analysis*. New Jersey: Prentice Hall.

## Course Evaluation

1. Class exercises and homework 20%
2. Labs 40%
4. Final Exam 35%
5. Professor's discretion 5%

## Grading Scale

| Outstanding Exceptional | Excellent Above Average | Acceptable Average | Poor Below Average | Failing |
|---|---|---|---|---|
| A = 93-100% | B+ =87–89% | C+ = 77-79% | D+ = 67-69% | F<60 |
| A- = 90–92% | B = 83–87% | C = 73-77% | D = 63-67% | |
| | B- = 80–82% | C- = 70-72% | D- = 60-63% | |

## Class Policy

You are expected to respect our learning environment. No web surfing, chatting, or phone calls are allowed. Class exercises and quizzes will be frequently given as an important component of class participation. No make-ups will be given.

All assignments should be turned in on time. Late work will be penalized 10% per day (Yes, weekends are days too). Exercises will not be accepted more than ten days following the due date (100% – (10 x 10%) = 0). You are welcome to discuss the labs amongst yourselves, but the final product you hand in *must be your own work.*

Exams must be taken on the assigned dates – NO MAKEUP EXAMS will be scheduled, unless you make a prior arrangement with the instructor or have legitimate documents.

**Important note regarding academic dishonesty:** University of Redlands has a clear and strict policy regarding academic misconduct. Please refer to the Catalog to get more information.

**Accommodations:**
Should you require academic accommodations, please consult with Amy Wilms, Assistant Dean of Academics and Student Life: http://www.redlands.edu/DisabilityServices.asp


**Policy Statements Regarding Discrimination, Harassment, Sexual Misconduct and Retaliation:**
These policy statements support the University's commitments to equality of opportunity and maintaining an academic environment and workplace that is free from unlawful discrimination, harassment, sexual misconduct, and retaliation. Each person to whom this policy applies shares a responsibility for upholding and enforcing this policy.

A. No Discrimination. The University prohibits and will not tolerate unlawful discrimination on the basis of age, color, race, ethnicity, national origin, ancestry, sex, marital status, pregnancy, status as a complaining party of domestic violence, sexual orientation, gender, gender identity or expression, physical or mental disability, genetic information, religion/creed, citizenship status (except to comply with legal requirements for employment), military/veteran status, or any other characteristic protected by law.

B. No Harassment. The University prohibits and will not tolerate unlawful harassment on the basis of the characteristics identified above.

C. No Sexual Misconduct. The University prohibits and will not tolerate sexual misconduct. Redlands is committed to fostering a safe, productive learning environment. Title IX and our school policy prohibit discrimination on the basis of sex, which regards sexual misconduct — including harassment, domestic and dating violence, sexual assault, and stalking. We understand that sexual violence can undermine students' academic success and we encourage students who have experienced some form of sexual misconduct to talk to someone about their experience, so they can get the support they need. Confidential support may be obtained from the Chaplain's Office and Counseling Center. Reporting should be done through the Title IX Office – contact listed below.

D. No Retaliation. The University prohibits and will not tolerate any retaliation against any person who, in good faith, complains about discrimination, harassment, or sexual misconduct. Similarly, the University prohibits and will not tolerate any retaliation against any person who, in good faith, demonstrates opposition to, or participates in an investigation of, alleged discrimination, harassment, or sexual misconduct.

Preferred first contact for Title IX Complaints from College of Arts & Sciences Students:
Amy Wilms, Deputy Title IX Coordinator
Assistant Dean of Academics & Student Life
Academic Success & Disability Services
Phone: (909) 748-8069

## Tentative Course Schedule

| Week | Dates | Topics | Readings | Assignments |
|------|-------|--------|----------|-------------|
| 2 | 1/16 | • **Introduction**<br>  – Introduction to geographic information analysis<br>  – Review of mathematical notation | 1, Appendix 3a Appendix 5a | **Assignment 1**: Math review |
| | 1/18 | • **Descriptive Statistics**<br>  – Measure of central tendency<br>  – Measures of variability, and distribution | 2.2, 3.1, 3.2, 3.5 | **Assignment 2**: descriptive statistics with SPSS |
| 3 | 1/23 | • **Probability (I)**<br>  – Probability theories | 5.1-5.2 | **Assignment 3**: Discrete and continuous probability distributions |
| | 1/25 | • **Probability (I)**<br>  – Discrete probability distributions | 5.3 | |
| 4 | 1/30 | • **Probability (II)**<br>  – Probability density functions<br>  – Normal distribution | 5.4 | |
| | 2/1 | • **Estimation**<br>  – Central limit theorem<br>  – Interval estimation | 7 | **Assignment 4**: Inferential statistics |
| 5 | 2/6 | • **Hypothesis Testing (I)**<br>  – Classic hypothesis testing<br>  – One sample z-test | 8.1-8.4 | |
| | 2/8 | • **Hypothesis Testing (II)**<br>  – One sample t-test<br>  – SPSS exercises | 8.1-8.4 | |
| 6 | 2/13 | • **Spatial Point Pattern Analysis**<br>  – Quadrat count method | 14.1 | **Assignment 5**: Correlation and regression |
| | 2/15 | • **Correlation**<br>  – Scatterplot / Pearson's r<br>• **Regression**<br>  Linear models | 4.1-4.4 | |
| | 2/16 | • **Regression**<br>  – Linear models<br>  Bivariate regression | 12.1-12.3 | |
| 7 | 2/20 | • **Regression**<br>  – Multiple regression | 13.1 | |
| | 2/22 | • **Final Exam** | | |