

Syllabus
Geography 3020 – Geographical Analysis
Spring 2021

Instructor: Tim Edgar, M.S., Assistant Professor (Lecturer)

Contact Information: tim.edgar@geog.utah.edu, GC 4842

Office Hours: Monday & Wednesday 10:00 AM – 11:00 AM over Zoom,
Tuesday 11:35 AM – 12:35 PM in GC 1825, or by appointment

Lecture: Tuesday & Thursday 9:10 AM-10:30 AM, SBS Lecture Hall (see below for location)

Lab: Tuesday or Thursday, 10:45 AM-11:35 AM, or Tuesday 12:55 PM-01:45 PM, GC 1825

Prerequisite: "C-" or better in MATH 1050 OR MATH 1070 OR MATH 1080, OR AP Calculus AB score of 3 or higher, OR AP Calculus BC score of 3 or higher, OR AP Statistics score of 3 or higher

Course Fulfills: Quantitative Reasoning-Statistics/Logic **and** Quantitative Intensive (QBQI)

Credit Hours: GEOG 3020 is a four credit hour course. At the University of Utah, it is assumed that there is at least one hour in class and two hours outside of class per week, or the equivalent combination, connected to every credit hour.

Course Catalog Description: Emphasizes the spatial point of view and presents techniques of spatial analysis applicable to all fields of geography. Introduction to the use of multiple correlation and regression techniques in geographic research with special attention addressing problems in the use of these techniques with spatial data.

Course Goals: The goal of this course is to provide students with an introduction to statistical methods used in geographic research. Developing a foundation for the application of statistical techniques, and the interpretation of their results, provides a base from which more advanced methodologies can be learned, and from which quantitative research can be approached. Emphasis is placed on the application of spatial and non-spatial statistical techniques to answer geographic research questions.

Course Objectives: By the end of this course, students will be able to:

- Explain and apply statistical methods used in geographical research
- Interpret the results of statistics used to analyze geographic data
- Understand why the analysis of spatial data require special consideration
- Gain experience with several software packages used in geographic research

Required Text and Materials:

- McGrew, Lembo, and Monroe. 2014. *An Introduction to Statistical Problem Solving in Geography (3rd ed.)*, Waveland Press, Inc. (ISBN: 9781478611196, paperback)
- TurningPoint Technology Audience Response System (ARS) (a.k.a. clicker)

Important dates:

Last day to add, drop, or audit classes

Friday, 29 January

Last day to elect CR/NC

Friday, 9 April

Last day to withdraw from classes

Friday, 12 March

Course Grading and Assessments

Table of Grades

Percentage Points:

Lab Assignments	50 %
Exam 1	15 %
Exam 2	15 %
Exam 3	15 %
In-Class/Online Exercises	5 %
Total	100 %

Grade Scale:

A	93-100 %
A-	90-93 %
B+	87-90 %
B	83-87 %
B-	80-83 %
C+	77-80 %
C	73-77 %
C-	70-73 %
D+	67-70 %
D	63-67 %
D-	60-63 %
E	<60 %

Grades	Points	Explanation
A	(4.0 points)	Excellent performance, superior achievement
A-	(3.7 points)	
B+	(3.3 points)	Good performance, substantial achievement
B	(3.0 points)	
B-	(2.7 points)	
C+	(2.3 points)	Standard performance and achievement
C	(2.0 points)	
C-	(1.7 points)	
D+	(1.3 points)	Substandard performance, marginal achievement
D	(1.0 points)	
D-	(0.7 points)	
E	(0.0 points)	Unsatisfactory performance and achievement

Lab Assignments: The lab assignments apply concepts learned in the online videos and in-class problem sets to analyze geographic datasets. Lab assignments are due one week from the day they are assigned and will be submitted through Canvas. See the *Lab Policies and Procedures* document for additional information regarding lab submissions.

Exams: There are three exams in the course. Dates of the exams are indicated in the course schedule. Exams may include multiple choice, fill in the blank, short answer, and essay questions. Exams cannot be made-up unless the instructor is contacted prior to the exam date. If a make-up exam is offered, it may take any form at the discretion of the instructor, and you will be required to take the exam at the University testing center. Please note that a fee is charged by the testing center for the use of their services.

In-Class/Online Exercises: In-class exercises will consist of individual and group activities; responses will be submitted via the Audience Response System (a.k.a. clickers). Students are scored on completion of the in-class exercises, an incorrect answer will not count against your grade. Missed in-class exercises cannot be made up, however, missed in-class exercises will not count towards a student's score in the course. Online quizzes, completed on Canvas, follow every set of video lectures. These exercises prepare students for exams and lab assignments by providing active learning opportunities that reinforce concepts introduced in the online videos.

Several questions from the Canvas quizzes will be used in a program wide learning outcome assessment.

Extra Credit: One extra credit assignment will be provided for this course after Exam 2.

Course Schedule and Topics

Date	Topic	Content	Reading
Week 1			
Tue 19 Jan	Syllabus & Course Introduction	Instructor contact information Grading and assessments Academic integrity, expectations and success	Syllabus
Thu 21 Jan	Chapter 1: Introduction	Statistical problem solving in geography	Pg. 3-19
Lab	Lab 1 - Lab Introduction, Policies and Procedures, and Establishing Your Working Directory		
Week 2			
Tue 26 Jan	Chapter 2: Geographic Data	Selected dimensions of geographic data Levels of measurement Measurement concepts	Pg. 21-27
Thu 28 Jan	Chapter 2: Geographic Data	Basic classification methods	Pg. 27-34
Lab	Lab 2 – Intro to R: A Language and Environment for Statistical Computing		
Week 3			
Tue 2 Feb	Chapter 3: Descriptive Statistics	Measures of central tendency (Skip \bar{X}_w) Measures of dispersion and variability	Pg. 39 -51
Thu 4 Feb	Chapter 3: Descriptive Statistics	Measures of shape or relative position Spatial data and descriptive statistics	Pg. 52-60
Lab	Lab 3 – Mean and Standard Deviation		
Week 4			
Tue 9 Feb	Chapter 4: Descriptive Spatial Statistics	Spatial measures of central tendency (Skip <i>Linear Directional Mean</i>)	Pg. 62-67
Thu 11 Feb	Chapter 4: Descriptive Spatial Statistics	Spatial measures of dispersion	Pg. 69-73
Lab	Lab 4 – Mean Center and Standard Distance		
Week 5			
Tue 16 Feb	Exam 1-Chapters 1,2,3,4		
Thu 18 Feb	Chapter 5: Basics of Probability	Basic probability terms and concepts	Pg. 77-81
Lab	No lab		
Week 6			
Tue 23 Feb	Chapter 5: Discrete Probability Distributions	Binomial distribution Poisson distribution	Pg. 81-83 Pg. 85-91
Thu 25 Feb	Chapter 6: Continuous Probability Distributions	Normal distribution Probability mapping	Pg. 93-100
Lab	Lab 5 – Probability		
Week 7 IVC			
Tue 2 Mar	Chapter 7: Basic Elements of Sampling	Sampling concepts Types of probability sampling Spatial sampling	Pg. 101-115
Thu 4 Mar	Chapter 8: Estimation in Sampling	Basic concepts in estimation Confidence intervals and estimation Sample size selection	Pg. 117-126 Pg. 134-135
Lab	Lab 6 – More Probability Distributions		
Week 8 IVC			
Tue 9 Mar	Chapter 9: Elements of Inferential Statistics	One-sample difference of means test Classical hypothesis testing <i>p</i> -value hypothesis testing	Pg. 141-148
Thu 11 Mar	Chapter 9: Elements of Inferential Statistics	Issues in inferential testing	Pg. 150-154
Lab	Lab 7 – Confidence Intervals and Sample Size		

Week 9

Tue 16 Mar	Chapter 10: Two-Sample Difference Tests	Two-sample difference of means tests (Skip content on <i>Wilcoxon</i> test)	Pg. 155-163
Thu 18 Mar	Chapter 10: Matched-Pairs Difference Tests	Matched-pairs difference tests (Skip content on <i>Wilcoxon</i> test)	Pg. 168-171
Lab	Lab 8 – Hypothesis Testing: One-Sample and Two-Sample Difference Tests		

Week 10

Tue 23 Mar	Review for Exam 2		
Thu 25 Mar	Exam 2-Chapters 5, 6, 7, 8, 9, 10		
Lab	No Lab		

Week 11

Tue 30 Mar	Chapter 11: Three-or-More-Sample Difference Test	Analysis of Variance (ANOVA) (Skip <i>Kruskal-Wallis</i> test)	Pg. 174-180
Thu 1 Apr	Chapter 13: Issues in Inferential Spatial Statistics	Types of spatial patterns	Pg. 205-206
	Chapter 14: Point Pattern Analysis	Nearest neighbor analysis Quadrat analysis	Pg. 210-221
Lab	Lab 9 – ANOVA		

Week 12

Tue 6 Apr	Chapter 15: Area Pattern Analysis	Join count analysis	Pg. 222-228
Thu 8 Apr	Chapter 16: Correlation	The nature of correlation Association of interval/ratio variables Association of ordinal variables	Pg. 239-250
Lab	Lab 10 – Point Pattern Analysis, Area Pattern Analysis		

Week 13

Tue 13 Apr	Chapter 13: Issues in Inferential Spatial Statistics	The concept of spatial autocorrelation	Pg. 206-208
	Chapter 15: Area Pattern Analysis	Moran's <i>I</i> spatial autocorrelation index	Pg. 229-235
Thu 15 Apr	Chapter 17: Simple Linear Regression	Form of relationship in SLR Strength of relationship in SLR	Pg. 252-258
Lab	Lab 11 – Correlation, Spatial Autocorrelation		

Week 14

Tue 20 Apr	Chapter 17: Simple Linear Regression	Residual analysis in SLR Inferential use of regression	Pg. 258-268
Thu 22 Apr	Chapter 17: Simple Linear Regression	Residual analysis in SLR Inferential use of regression	Pg. 258-268
Lab	Lab 12 – Simple Linear Regression, Review		

Week 15

Tue 27 Apr	Review for Exam 3		
Lab	No Lab		

Week 16

Wed 5 May	Exam 3-Chapters 11, 13, 14, 15, 16, 17 – 8:00 AM-10:00 AM		
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**Note that the above schedule is subject to change.*

Additional Information

Scheduling Conflicts: Please speak with the instructor within the first two weeks of class regarding any known conflicts you may have with the course schedule.

Academic Integrity: The University of Utah is committed to nurturing academic excellence, truth, honesty, and personal integrity. The faculty expects all students to maintain high ethical standards. Academic misconduct will not be tolerated. Penalties may include failure of an assignment, or possibly the entire course, and the filing of formal charges with appropriate university authorities. Academic misconduct includes, but is not limited to, cheating, misrepresenting one's work, and plagiarism:

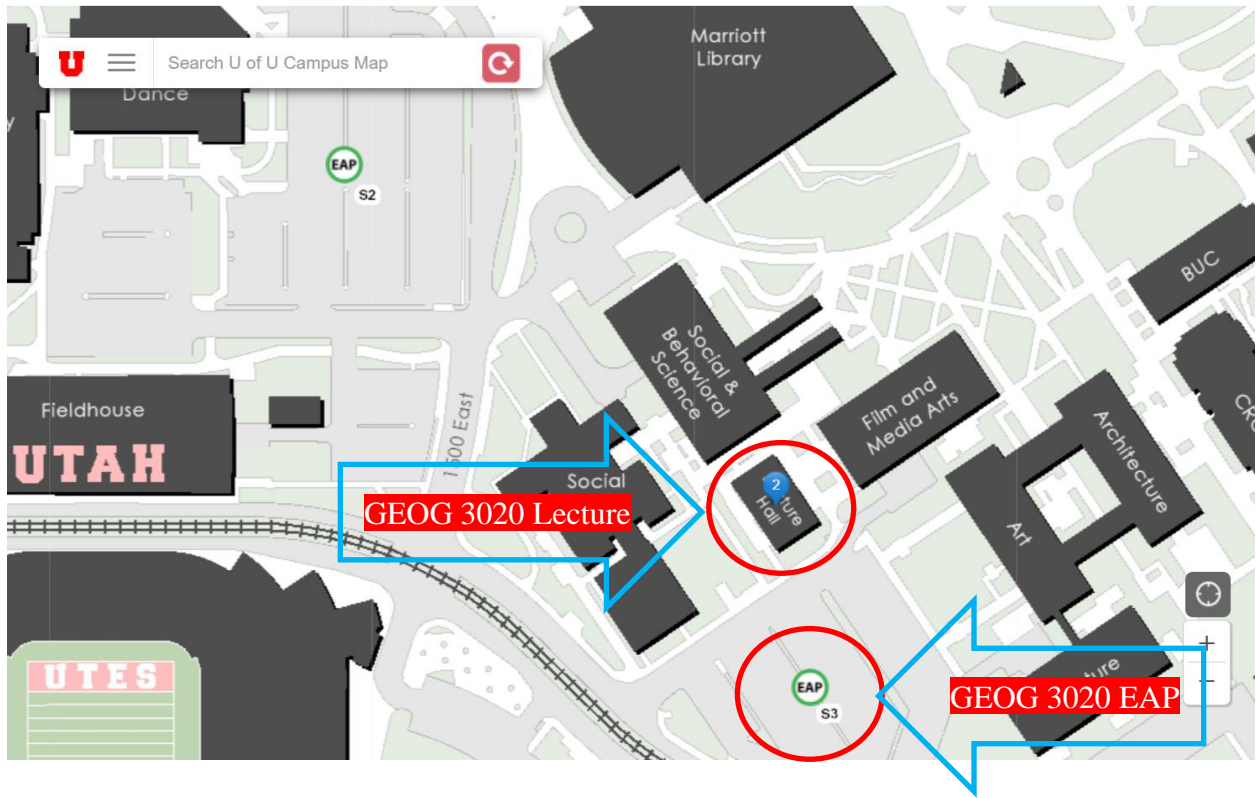
As stated in the [Student Code](#); "Academic misconduct' includes, but is not limited to, cheating, misrepresenting one's work, inappropriately collaborating, plagiarism, and fabrication or falsification of information, as defined further below. It also includes facilitating academic misconduct by intentionally helping or attempting to help another to commit an act of academic misconduct."

- "Cheating' involves the unauthorized possession or use of information, materials, notes, study aids, or other devices in any academic exercise, or the unauthorized communication with another person during such an exercise."
- "Misrepresenting one's work includes, but is not limited to, representing material prepared by another as one's own work, or submitting the same work in more than one course without prior permission of both faculty members."
- "Plagiarism' means the intentional unacknowledged use or incorporation of any other person's work in, or as a basis for, one's own work offered for academic consideration or credit or for public presentation. Plagiarism includes, but is not limited to, representing as one's own, without attribution, any other individual's words, phrasing, ideas, sequence of ideas, information or any other mode or content of expression."
- "Fabrication' or 'falsification' includes reporting experiments or measurements or statistical analyses never performed; manipulating or altering data or other manifestations of research to achieve a desired result; falsifying or misrepresenting background information, credentials or other academically relevant information; or selective reporting, including the deliberate suppression of conflicting or unwanted data. It does not include honest error or honest differences in interpretations or judgments of data and/or results."

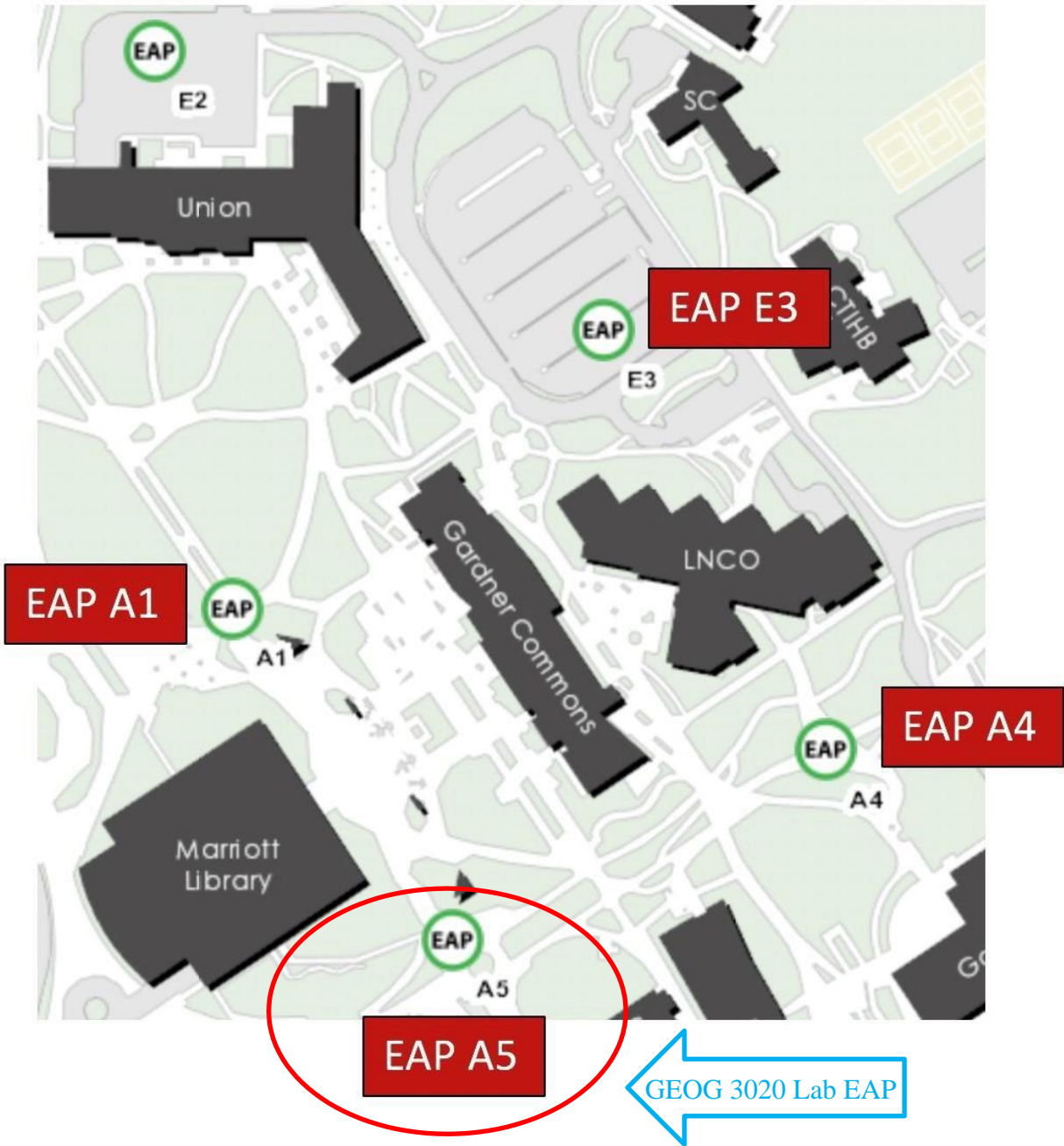
This course has a zero-tolerance policy for academic misconduct. For any coursework in which it is demonstrated that a student engaged in academic misconduct the resulting academic sanction will be a score of zero for the coursework. Additionally, the student will be required to meet with the academic advisor from the Department of Geography and/or your respective department, and the instance of academic misconduct will be entered into a university database. See the Student Code for additional information on academic sanctions

Disability Accommodation: The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the [Center for Disability & Access](#), 162 Olpin Union Building, 801-581-5020. CDA will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the Center for Disability & Access.

Lecture Location and Emergency Assembly Point for Lecture



Emergency Assembly Point for Lab Sections



Safety & Wellness

Your safety is our top priority. In an emergency, dial 911 or seek a nearby emergency phone (throughout campus). Report any crimes or suspicious people to 801-585-COPS; this number will get you to a dispatch officer at the University of Utah [Department of Public Safety](#) (DPS). If at any time, you would like to be escorted by a security officer to or from areas on campus, DPS will help — just give a call. For more information regarding safety and to view available training resources, including helpful videos, visit [SAFEU](#).

The University of Utah seeks to provide a safe and healthy experience for students, employees, and others who make use of campus facilities. In support of this goal, the University has established confidential resources and support services to assist students who may have been affected by harassment, abusive relationships, or sexual misconduct. A detailed listing of University Resources for campus safety can be found on the Office of the Registrar's [Campus Safety / Responding to Harassment](#) page.

Your well-being is key to your personal safety. If you are in crisis, call Community Crisis Intervention & Support Services at 801-587-3000; help is close.

The university has additional excellent resources to promote emotional and physical wellness, including the [Counseling Center](#), the [Wellness Center](#), and the [Women's Resource Center](#). Counselors and advocates in these centers can help guide you to other resources to address a range of issues, including substance abuse and addiction.

Face coverings are required in all in-person classes for both students AND faculty.

Based on CDC guidelines, the University requires everyone to wear face coverings in shared public spaces on campus, including our classroom. As a reminder, when I wear a face covering, I am protecting you. When you wear a face covering, you are protecting me and all of your classmates. If you forget your face covering, I will ask you to leave class to retrieve it. If you repeatedly fail to wear a face covering in class, I will refer you to the Dean of Students for a possible violation of the Student Code. Note that some students may qualify for accommodations through the Americans with Disabilities Act (ADA). If you think you meet these criteria and desire an exception to the face covering policy, contact the Center for Disability & Access (CDA). Accommodations should be obtained prior to the first day of class so that I am notified by CDA of any students who are not required to wear a face covering.

Note: The syllabus is not a binding legal contract. It may be modified by the instructor when the student is given reasonable notice of the modification, particularly when the modification is done to rectify an error that would disadvantage the student.