

# Syllabus

## Geography 3020 – Geographical Analysis

### Spring 2022

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

**Contact Information:** [tim.edgar@geog.utah.edu](mailto:tim.edgar@geog.utah.edu), GC 4842

**Office Hours:** Tuesday & Thursday 10:30 AM – 11:30 AM,  
Monday 9:30 AM – 10:30 AM, or by appointment

**Teaching Assistant:** Jiuying (Jamin) Han, M.S.

**Contact Information** [jiuying.han@utah.edu](mailto:jiuying.han@utah.edu)

**Office Hours:** Tuesday 11:35 AM-12:55 PM, and Friday 1:00 PM – 3:00 PM, GC 1825

**Lecture:** Tuesday & Thursday 9:10 AM-10:30 AM, GC 2560

**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 / 1060 / 1080 / 1090 / 1210 / 1220 / 1250 / 1260 / 1310 / 1311 / 1320 / 1321) OR AP CalcAB score 3+ OR AP CalcBC score 3+ OR AP Stats score 3+ OR ACT Math score 26+ OR SAT Math score 640+ OR IB Math score 5+

**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. Course covers various spatial and non-spatial descriptive statistics, several discrete and continuous probability distributions, and a small suite of spatial and non-spatial inferential statistics common to geographic research. Special attention is given 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 (3<sup>rd</sup> ed.)*, Waveland Press, Inc. (ISBN: 9781478611196, paperback)
- TurningPoint Technology Audience Response System (ARS) (a.k.a. clicker)

**Important dates:**

Last day to add, drop, audit, and elect CR/NC

Friday, 21 January

Last day to withdraw from classes

Friday, 4 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 %
<b>Total</b>	<b>100 %</b>

**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 Syllabus* 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. 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
<b>Week 1</b>			
Tue 11 Jan	Syllabus & Course Introduction	Instructor contact information Grading and assessments Academic integrity, expectations and success	Syllabus
Thu 13 Jan	Chapter 1: Introduction	Statistical problem solving in geography	Pg. 3-19
Lab	Lab 1 – Order of Operation and Practice with Excel		
<b>Week 2</b>			
Tue 18 Jan	Chapter 2: Geographic Data	Selected dimensions of geographic data Levels of measurement Measurement concepts	Pg. 21-27
Thu 20 Jan	Chapter 2: Geographic Data	Basic classification methods	Pg. 27-34
Lab	Lab 2 – Sigma Notation, and Intro to R: A Language and Environment for Statistical Computing		
<b>Week 3</b>			
Tue 25 Jan	Chapter 3: Descriptive Statistics	Measures of central tendency (Skip $\bar{X}_w$ ) Measures of dispersion and variability	Pg. 39 -51
Thu 27 Jan	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		
<b>Week 4</b>			
Tue 1 Feb	Chapter 4: Descriptive Spatial Statistics	Spatial measures of central tendency (Skip <i>Linear Directional Mean</i> )	Pg. 62-67
Thu 3 Feb	Chapter 4: Descriptive Spatial Statistics	Spatial measures of dispersion	Pg. 69-73
Lab	Lab 4 – Mean Center and Standard Distance		
<b>Week 5</b>			
Tue 8 Feb	<b>Exam 1 – Chapters 1,2,3,4</b>		
Thu 10 Feb	Chapter 5: Basics of Probability	Basic probability terms and concepts	Pg. 77-81
Lab	No lab		
<b>Week 6</b>			
Tue 15 Feb	Chapter 5: Discrete Probability Distributions	Binomial distribution Poisson distribution	Pg. 81-83 Pg. 85-91
Thu 17 Feb	Chapter 6: Continuous Probability Distributions	Normal distribution Probability mapping	Pg. 93-100
Lab	Lab 5 – Probability		
<b>Week 7</b>			
Tue 22 Feb	Chapter 7: Basic Elements of Sampling	Sampling concepts Types of probability sampling Spatial sampling	Pg. 101-115
Thu 24 Feb	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		
<b>Week 8</b>			
Tue 1 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 3 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 8 Mar	No Class – Spring Break		
Thu 10 Mar	No Class – Spring Break		
Lab	No Lab		

**Week 10**

Tue 15 Mar	Chapter 10: Two-Sample Difference Tests	Two-sample difference of means tests (Skip content on <i>Wilcoxon</i> test)	Pg. 155-163
Thu 17 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 11**

Tue 22 Mar	Review for Exam 2		
Thu 24 Mar	<b>Exam 2 – Chapters 5, 6, 7, 8, 9, 10</b>		
Lab	No Lab		

**Week 12**

Tue 29 Mar	Chapter 11: Three-or-More-Sample Difference Test	Analysis of Variance (ANOVA) (Skip <i>Kruskal-Wallis</i> test)	Pg. 174-180
Thu 31 Mar	Chapter 13: Issues in Inferential Spatial Statistics Chapter 14: Point Pattern Analysis	Types of spatial patterns  Nearest neighbor analysis Quadrat analysis	Pg. 205-206  Pg. 210-221
Lab	Lab 9 – ANOVA		

**Week 13**

Tue 5 Apr	Chapter 15: Area Pattern Analysis	Join count analysis	Pg. 222-228
Thu 7 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 14**

Tue 12 Apr	Chapter 13: Issues in Inferential Spatial Statistics Chapter 15: Area Pattern Analysis	The concept of spatial autocorrelation  Moran's <i>I</i> spatial autocorrelation index	Pg. 206-208  Pg. 229-235
Thu 14 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 15**

Tue 19 Apr	Chapter 17: Simple Linear Regression	Residual analysis in SLR Inferential use of regression	Pg. 258-268
Thu 21 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 16**

Tue 26 Apr	Review for Exam 3		
Thu 28 Apr	<b>Exam 3 – Chapters 11, 13, 14, 15, 16, 17 – 8:00 AM-10:00 AM</b>		
Lab	No Lab		

*\*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:

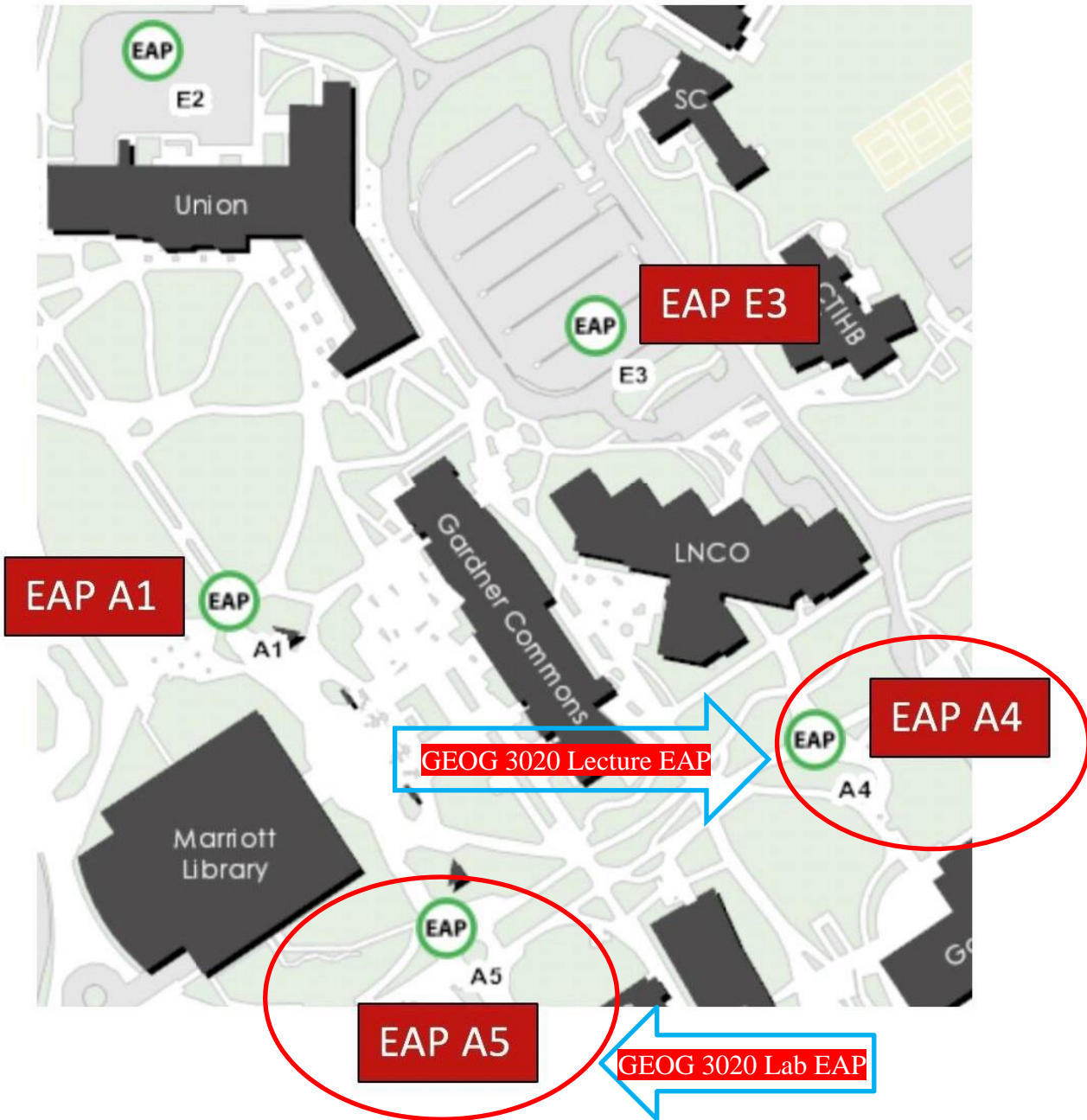
As stated in the [Student Code](#); "Academic misconduct' includes, but is not limited to, cheating, misrepresenting one's work, inappropriately collaborating, plagiarism, and fabrication or falsification of information, as defined further below. It also includes facilitating academic misconduct by intentionally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

Emergency Assembly Point for Lecture and Lab



## 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 [University Safety Department](#) (USD). If at any time, you would like to be escorted by a security officer to or from areas on campus, USD 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.

## COVID-19 Guidelines

University leadership has urged all faculty, students, and staff to **model the vaccination, testing, and masking behaviors** we want to see in our campus community.

These include:

- Vaccination
- Masking indoors
- If unvaccinated, getting weekly asymptomatic coronavirus testing

### *Vaccination*

- **Get a COVID-19 vaccination** if you have not already done so. Vaccination is proving highly effective in preventing severe COVID-19 symptoms, hospitalization and death from coronavirus. Vaccination is the single best way to stop this COVID resurgence in its tracks.
- Many in the campus community already have gotten vaccinated:
  - More than 80% of U. employees
  - Over 70% of U. students
- Visit [MyChart](#), [Campus Alert-Vaccine](#), or [Vaccines.gov](#) to schedule your vaccination.

### *Masking*

- While masks are no longer required outside of Health Sciences facilities, UTA buses and campus shuttles, CDC guidelines now call for everyone to wear face masks indoors.
  - Check the [CDC website](#) periodically for masking updates
  - Treat masks like seasonal clothing (i.e. during community surges in COVID transmission, masks are strongly encouraged indoors and in close groups outside).

### *Testing*

- If you are not yet vaccinated, get weekly asymptomatic coronavirus tests. This is a helpful way to protect yourself and those around you because asymptomatic individuals can unknowingly spread the coronavirus to others.
  - Asymptomatic testing centers are open and convenient:
    - Online scheduling Saliva test (no nasal swabs)
    - Free to all students returning to campus (required for students in University housing)
    - Results often within 24 hours
    - Visit [Campus Alert-Testing](#)
- **Remember: Students must self-report if they test positive for COVID-19** via [COVID-19 CENTRAL @THEU](#).

*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.*