# GEOGRAPHY 30313: INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEMS

**Fall 2014**
**Texas Christian University**
**MW 3:30-4:50**
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Classroom: Scharbauer 4022
Office Hours: W 12:00-1:45 or by appointment, Scharbauer 2015D

**Course overview:**

The ability to work with and analyze spatial information is increasingly sought in a variety of professional fields. Geographic visualization and analysis techniques are utilized by companies and organizations to discover important trends in their data, and to identify new areas of opportunity. In this course, you'll begin to acquire these skills.

This course is an introduction to Geographic Information Systems (GIS), with a focus on the use of GIS for urban and social science applications. No prior knowledge of GIS is assumed for this course, although students should have some facility with basic mathematics, statistics, and spreadsheet programs.

I have two major goals for this course. The first goal is to help you acquire significant technical GIS skills, and become comfortable solving problems with spatial data in a digital environment. You'll be working primarily with ESRI's ArcGIS suite of applications, the GIS industry standard. The second, and perhaps more important goal, is to help you become *good geospatial analysts*. To use GIS data correctly, you'll need to be aware of the many unique properties of spatial data – and the potential errors that can arise if you ignore these properties. Additionally, as a GIS analyst you'll need to draw from a multitude of disciplines as you prepare your projects. GIS analysts are in many cases concurrently sociologists, programmers, historians, environmental scientists, graphic artists… and the list goes on! You'll learn how to put all of these diverse perspectives together into a coherent GIS analysis.

**COURSE FORMAT:**

**Mondays** will be devoted to lecture, discussion, and tutorials, and **Wednesdays** will be used for the lab assignments, with a couple exceptions. The class will be managed through its corresponding Learning Studio website, accessible through the portals at http://my.tcu.edu or http://tcuglobal.edu. You will submit your assignments via the Learning Studio website, and I'll use the website to post relevant course announcements and lecture notes.

Primary textbook:
Bolstad, Paul (2012). *GIS Fundamentals: A First Text on Geographic Information Systems, Fourth Edition*. White Bear Lake, MN: Eider Press.

The book is available at the TCU Bookstore, online, or as an e-book.

You'll occasionally have other assigned readings not in the Bolstad text. These readings will be available in PDF format via the course Learning Studio website. Readings are expected to be completed before you arrive in class the day they are specified (except for the first week of class).

**EVALUATION:**

Your evaluation for this course will be composed of the following components:

**Exams** will cover key conceptual issues that we address in this course. There will be a midterm exam in early October and a final exam during Finals Week. Each exam will be worth **20 percent of your grade**. If you are a senior and plan to graduate this semester, please talk to me right away so we can make alternative arrangements to schedule your final exam.

**Research problems** will simulate the types of assignments you may get while working as professional GIS users. These assignments will consist of hypothetical projects that you are assigned by a client or supervisor, and will involve a synthesis of all of the topics and skills we have covered to that point in the course. These assignments, as with many in the "real world," are relatively open-ended, meaning that you have some flexibility in choosing the methods and approaches used to solve your problem. Deliverables will include a brief report summarizing your findings and your rationale for the method(s) you used to solve the problem, as well as any maps that illustrate your findings. Assignments will be evaluated on their methodological and conceptual soundness, as well as their clarity of argument. Each of the two research problems are worth **12 percent of your grade**.

**Labs** will be assigned most weeks, and are largely walk-throughs to familiarize you with various aspects of using GIS software. Each lab assignment is worth **4 percent of your grade**, and will be graded based on its completeness. Partially-complete assignments or those with noticeable errors or lack of attention to detail will be penalized accordingly. Labs are due two weeks after they are assigned.

All assignments will receive a **10 percent penalty** for each day they are submitted past the due date.

**The minimum percentages** to achieve a specific grade are as follows:

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| 94: A | 73: C |
| 90: A- | 70: C- |
| 87: B+ | 67: D+ |
| 83: B | 63: D |
| 80: B- | 60: D- |
| 77: C+ | Below 60 percent: F |

I will award an incomplete (I) only in the most extreme and exceptional circumstances. Please notify me as soon as possible if you are in a situation where you feel you require an I.

The **attendance** policy for this course corresponds to the official TCU attendance policy, which reads, ***"Regular and punctual class attendance is essential, and no assigned work is summarily excused because of absence, no matter what the cause."***

**Make-up exams** will only be permitted in the instance of **a documented illness or emergency** or **a documented TCU-sanctioned activity**, provided that **you notify me of your absence before the examination**. Students are responsible for arranging a make-up examination with me. In the event that you miss an exam and do not meet these conditions, you will receive a score of **zero** for the exam.

**COURSE SCHEDULE:**

| Date | Topic | Lab |
|---|---|---|
| **Week 1: August 25** | Introduction to GIS<br><br>GIS data models: raster and vector<br><br>**Readings: Bolstad, Ch. 1-2** | Lab 1: Getting to know ArcGIS |
| **Week 2: September 1** | **No class Monday for Labor Day holiday** | Lab 2: Making maps in ArcGIS |
| **Week 3: September 8** | Introduction to the US Census<br><br>**Reading: "Introduction to the US Census"** | |
| **Week 4: September 15** | Tables, attributes, and queries<br><br>**Reading: Bolstad, Ch. 8** | Lab 3: Working with Excel and Census data |
| **Week 5: September 22** | Cartographic principles: basics of map-making<br><br>**Reading: selection from Brewer, *Designing Better Maps*** | Lab 4: Symbology and visualization in ArcGIS |
| **Week 6: September 29** | Scale and coordinate systems<br><br>**Reading: Bolstad, Ch. 3** | **Research problem #1 assigned** |
| **Week 7: October 6** | Coordinate systems and map projections, continued | **Midterm Exam: Wednesday, October 8** |
| **Week 8: October 13** | **No class Monday for Fall break** | Open lab to work on Research problem #1 |
| **Week 9: October 20** | Creating digital data: georeferencing, digitizing, GPS<br><br>**Reading: Bolstad, Ch. 4-5** | Lab 5: Mapping your way through the TCU campus<br><br>**Research problem #1 due Friday, October 24** |
| **Week 10: October 27** | Spatial analysis I: Map overlay and | Lab 6: Market research and |

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| | geoprocessing<br><br>**Reading: Bolstad, Ch. 9** | population estimates |
| **Week 11: November 3** | Spatial analysis II: Working with raster data<br><br>**Reading: Bolstad, Ch. 10** | Lab 7: Land cover change |
| **Week 12: November 10** | Spatial analysis III: area, distance, and networks<br><br>**Reading: Curtin, "Network Analysis in Geographic Information Science"** | **Research problem #2 assigned** |
| **Week 13: November 17** | GIS on the Internet<br><br>**Reading: Selection from Fu & Sun, *Web GIS: Principles and Applications*** | Lab 8: Making an interactive web map |
| **Week 14: November 24** | Open lab to work on Research Problem #2 | **Thanksgiving break** |
| **Week 15: December 1** | GIS modeling<br><br>**Reading: Bolstad, Ch. 13** | Lab 9: Introduction to ModelBuilder<br><br>**Research problem #2 due Friday, December 5** |
| **Week 16: December 8** | GIS data quality standards and GIS ethics<br><br>**Reading: Curry, "The Digital Individual and the Private Realm"** | |
| **Exam 2 (non-cumulative): Wednesday, December 17 from 3:00-5:30** | | |

**SOFTWARE:**

The software used in this course will be ArcGIS 10.2, produced by the Environmental Systems Research Institute (Esri, pronounced *ez-ree*). There are many websites and books available to provide you with further assistance with the software. The Esri ArcGIS help documentation (http://resources.arcgis.com/en/help/main/10.2/) is quite extensive and can assist with questions ranging from the very basic to the very complicated. Additionally, ESRI maintains online forums (https://geonet.esri.com/community/discussions-lobby) where you can browse user questions regarding ArcGIS and ask your own. GIS Stack Exchange (http://gis.stackexchange.com) is also a very good resource for GIS professionals, and you may find some of your questions answered on this site. However, it is geared toward an advanced GIS user, and many discussions are beyond the scope of this course.

As we only have 80 minutes of official laboratory time each week, it is possible that you will need additional time to complete your assignments. ArcGIS is available for use in the Urban Institute computer lab (Scharbauer 2015A), TCU Library computer lab, and the GIS lab in Tucker 002 (in addition to Scharbauer 4022), and can be accessed outside of class hours. Additionally, I have student licenses of ArcGIS available for you to download and install on your home computers if you are interested. Please let me know as soon as possible, and I will send you the installation instructions and the license code. Unfortunately for Mac users, ArcGIS still runs exclusively on Windows at this time.

**OTHER ISSUES**

**Academic conduct:**

Although attendance is not an explicit part of your course grade, I will be recording attendance to help guide me in my final grading decisions. If you have to miss class for a TCU-related event and you know when these events will take place (i.e. athletic competition, musical performance, etc.), give me advance notice so that we can work together to ensure that you remain on track. Additionally, if you need to miss class for illness or family emergency, please give me documentation and I'll count the absence as excused.

This course will comply with TCU policies on academic conduct and plagiarism. The TCU statement on academic misconduct from the Student Handbook (Section 3.4) is below: *Academic Misconduct (Sec. 3.4 from the Student Handbook) –Any act that violates the academic integrity of the institution is considered academic misconduct. The procedures used to resolve suspected acts of academic misconduct are available in the offices of Academic Deans and the*

*Office of Campus Life and are listed in detail in the Undergraduate Catalog (Student Policies>Academic Conduct Policy Details; http://www.catalog.tcu.edu/current_year/undergraduate/). Specific examples include, but are not limited to:*

- *Cheating: Copying from another student's test paper, laboratory report, other report, or computer files and listings; using, during any academic exercise, material and/or devices not authorized by the person in charge of the test; collaborating with or seeking aid from another student during a test or laboratory without permission; knowingly using, buying, selling, stealing, transporting, or soliciting in its entirety or in part, the contents of a test or other assignment unauthorized for release; substituting for another student or permitting another student to substitute for oneself.*
- *Plagiarism: The appropriation, theft, purchase or obtaining by any means another's work, and the unacknowledged submission or incorporation of that work as one's own offered for credit. Appropriation includes the quoting or paraphrasing of another's work without giving credit therefore.*
- *Collusion: The unauthorized collaboration with another in preparing work offered for credit.*

In short: please don't cheat, as it is a very serious offense and you will get caught. Your three research problems will be checked for plagiarism using Turnitin, TCU's anti-plagiarism software. If you are in any way struggling in the course and tempted to cheat, please come talk to me so we can address your issues face to face.

Finally, the classroom is a place where diversity of opinions and perspectives is not only welcomed, but highly encouraged. I ask you to always be mindful and respectful of the diversity (broadly defined) of your classmates.

**Disability statement:**

TCU's statement on disabilities is as follows:

*Disabilities Statement: Texas Christian University complies with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973 regarding students with disabilities. Eligible students seeking accommodations should contact the Coordinator of Student Disabilities Services in the Center for Academic Services located in Sadler Hall, 1010. Accommodations are not retroactive, therefore, students should contact the Coordinator as soon as possible in the term for which they are seeking accommodations. Further information can be obtained from the Center for Academic Services, TCU Box 297710, Fort Worth, TX 76129, or at (817) 257-6567.*

**STATEMENT ON USE OF THE SYLLABUS**

This syllabus is intended for your use as a guide to assist in your planning for the semester. **I reserve the right to make changes to the syllabus and schedule if necessary**. However, rest assured that if I do make any changes to the syllabus, I will give you plenty of advance notice.