

# **GEOGRAPHY 40323: URBAN AND BUSINESS APPLICATIONS OF GEOGRAPHIC INFORMATION SYSTEMS**

**Spring 2016**

**Texas Christian University**

**TuTh 11:00 – 12:20**

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Classroom: Scharbauer 4022

Office hours: M 12:00 – 2:00 or by appointment, Scharbauer 2015D

## **COURSE OVERVIEW**

This advanced GIS course gives students experience with:

- Using GIS to explore and analyze urban and business data;
- The use of aerial photography to study urban growth and change;
- Network analysis and location-allocation modeling;
- 3D modeling of urban areas;
- Employing spatial statistics and exploratory spatial data analysis (ESDA) to study urban and business trends;
- Working with geodemographic classification systems;
- Developing web GIS applications to serve local community or business needs.

In addition to these topics, students will complete a semester-long course project that uses GIS to assist a business or community organization in the Fort Worth area.

As this is an advanced course, students should have completed GEOG 30313: Introduction to GIS or an equivalent introductory GIS course. Students who wish to substitute GIS experience for coursework as a prerequisite must have instructor approval to do so.

## **COURSE FORMAT**

Class sessions will be hybrids of lecture, discussion, tutorials, and lab work. While there is no required textbook for this course, I will be assigning various readings that correspond to course topics. Readings will be posted to the course Learning Studio website as PDF documents, and students are expected to complete the readings before class to facilitate class discussion.

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 all of your

assignments via the Learning Studio website, and I'll use the website to post relevant course announcements and lecture notes.

## **EVALUATION AND COURSE POLICIES**

There are a total of 100 possible points in this course. Evaluation for this course will be based upon regular lab assignments, in-class tutorials, a mid-semester project, and the completion of a semester-long course project. Except when otherwise specified, all assignments will be due on the Wednesday of the week that they are listed in the course schedule.

**Lab assignments** will give students practical experience with the topics we cover in class. They will consist largely of problem-solving exercises that employ the GIS methods learned by the students. There will be eight lab assignments during the semester, each worth **5 points**. Unless otherwise specified, lab assignments will be due two weeks after the day they are assigned.

**In-class credit** will be based on short exercises that we work together on during class. You'll submit evidence during class to show that you completed the exercise. In sum, in-class credit will comprise **10 points**. In-class credit cannot be made up without an excused absence (documented illness or emergency, or a TCU-sanctioned activity).

**The mid-semester project** will be a shorter project that simulates a task you might be assigned as a professional working in the fields of urban and/or business GIS. You will be given a project to complete in February, which will be due on March 13. Your deliverable will consist of a coherent short project report, complete with maps, data tables, and a write-up. The mid-semester project is worth **20 points**.

**The semester project** is the centerpiece of your work for the course. In this project, you will produce a GIS project. The project in sum is worth **30 points**.

- **A poster presentation** will be worth a **total of 10 points**.
- **A final 8-page report** will comprise the remaining **20 points** of your score for the semester project. The report will present the results of your research project, and should include an introduction, literature review, methodology section, results section, and conclusion.

Interested students are encouraged to present their work at the AddRan Festival of Undergraduate Research. Students who present at the Festival will receive extra credit. For more information, visit the following website:

[http://www.econ.tcu.edu/harvey/AddRan\\_Research/AddRanFestival.html](http://www.econ.tcu.edu/harvey/AddRan_Research/AddRanFestival.html).

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

**Grades** will be based on the following ranges:

94 points and higher: A	73-76 points: C
90-93 points: A-	70-72 points: C-
87-89 points: B+	67-69 points: D+
83-86 points: B	63-66 points: D
80-82 points: B-	60-62 points: D-
77-79 points: C+	Below 60 points: F

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.”***

Attendance, in and of itself, is not an explicit part of the course grade. However, as mentioned, tutorials cannot be made up without an excused absence. Additionally, leniency in terms of deadlines will only be permitted in the instance of a **documented illness or emergency** or a **documented TCU-sanctioned activity**.

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.

## **COURSE SCHEDULE**

<b>Date</b>	<b>Topics</b>	<b>Assignments</b>
<b>Week 1: January 12-14</b>	<p>Course introduction; sources of demographic and business data</p> <p>Readings: “Analyzing demographic and social data” and “Analyzing economic data” from MacDonald and Peters, <i>Urban Policy and the Census</i></p>	<p>Lab 1: GIS review; mapping Fort Worth open data</p>
<b>Week 2: January 19-21</b>	<p>Spatial databases and SQL (CartoDB)</p> <p>Reading: “Intro to SQL and PostGIS”  <a href="http://academy.cartodb.com/courses/sql-postgis/intro-to-sql-and-postgis/">http://academy.cartodb.com/courses/sql-postgis/intro-to-sql-and-postgis/</a></p>	

<b>Week 3: January 26-28</b>	Urban mapping for the web (Mapbox)  Reading: "Get started with Mapbox Studio" <a href="https://www.mapbox.com/help/getting-started-mapbox-studio-1/">https://www.mapbox.com/help/getting-started-mapbox-studio-1/</a>	Lab 2: Web map design
<b>Week 4: February 2-4</b>	Web map design and web mapping APIs  Reading: Selection from Muehlenhaus, <i>Web Cartography</i>	
<b>Week 5: February 9-11</b>	Spatial statistics and exploratory spatial data analysis (ESDA)  Reading: "Statistics and statistical methods in economic development using GIS" from Pogodzinski and Kos, <i>Economic Development and GIS</i>	Lab 3: Spatial statistics
<b>Week 6: February 16-18</b>	Remote sensing and aerial photography in urban analysis  Reading: "Working with raster data and imagery in economic development analysis" from Pogodzinski and Kos, <i>Economic Development and GIS</i>	Lab 4: Measuring urban growth from aerial photography
<b>Week 7: February 23-25</b>	3D modeling applications in urban planning and analysis	Lab 5: 3D modeling and CityEngine
<b>Week 8: March 1-3</b>	Project meetings/time to work on your labs & mid-semester projects	
<b>Week 9: March 8-10</b>	<b>SPRING BREAK – NO CLASS</b>	<b>Mid-semester project due Sunday, March 13</b>
<b>Week 10: March 15-17</b>	Network analysis, routing, and location-allocation modeling  Reading: Curtin, "Network analysis in	Lab 6: Network analysis

	Geographic Information Science”	
<b>Week 11: March 22-24</b>	GIS in real estate  Guest speaker: Stephen Lopez, GIS Analyst, Jones Lang LaSalle	
<b>Week 12: March 29-31</b>	Market analysis & geodemographic segmentation  Reading: Alexiou and Singleton, “Geodemographic analysis” from <i>Geocomputation: A Practical Primer</i>	Lab 7: Business analytics with GIS
<b>Week 13: April 5-7</b>	Project work	
<b>Week 14: April 12-14</b>	Project work	
<b>Week 15: April 19-21</b>	Working as professionals in urban and/or business GIS	Lab 8: Preparing a resume and cover letter for the urban/business GIS job market
<b>Week 16: April 26</b>	Poster printing	
<b>Final report due Monday, May 2</b>		
<b>Poster presentation session: 11:30-2:00, Tuesday, May 3 (our scheduled final exam time)</b>		

## SOFTWARE

You’ll be using a number of software packages in this course. The primary software used in this course will be ArcGIS 10.3, 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://desktop.arcgis.com/en/desktop/>) 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/welcome>) 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.

ArcGIS is available for use in the Center for Urban Studies computer lab in SCHAR 2015A, the TCU Library computer lab, and the GIS lab in Tucker 002, 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 software to be used in this class includes CartoDB, a web-based database and mapping platform (<https://cartodb.com/>), Mapbox Studio, a web-based cartographic design platform (<https://www.mapbox.com/studio>) and GeoDa, a program for exploratory spatial data analysis (<https://geodacenter.asu.edu/software/downloads>). All of these programs are free with registration and can be used on your home computer, given that you have an internet connection.

## **OTHER ISSUES**

### **Academic conduct:**

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/](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 assignments and reports will be checked for plagiarism using Turnitin, TCU's anti-plagiarism software. **Cases of cheating will result in an automatic failure of the course and will be reported to the appropriate University officials.** 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.