

GEOG 4230/5230

“Location Intelligence: Business GIS Concepts & Applications”

WEEK 1: MOTIVATION AND FUNDAMENTALS



Welcome to GEOG 4230/5230

This course explores a wide range of tools and concepts that businesses and other organizations use to make better decisions

There are two main parts to this course:

1. Learning the ideas: in-class exploration of powerful location concepts from several **application areas**
2. Using the ideas: five **applied GIS labs** that exposes you to specific tools, and a two-phase **semester project** focused on a real-world problem being faced by a real-world business

More on these course activities later...

Why am I teaching this class?

The things you will learn here are pretty much exactly what I did for my clients in my consulting firm for ten years...

Map 2-5a: Median Household Income
Love Field Legend Terminal: 10 Minute Drive Time Zone

Altavision Geographics

Consulting project in Dallas from 2006

Why am I teaching this class?

The things you will learn here are pretty much exactly what I did for my clients in my consulting firm for ten years...

There is a ton of career opportunity in the location intelligence field, and I want to share this with our UNT community

Geographics

Consulting project in Dallas from 2006

Who is Your Instructor?

Education: BS in Engineering Physics, MA & PhD in Geography

Background: Proud Canadian 🇨🇦, Past Business Founder/Owner 

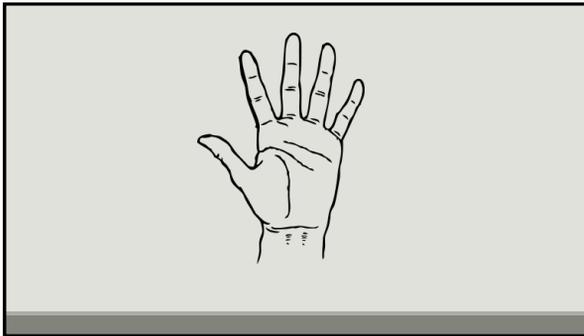
UNT: Glad to be in my 15th Year at UNT 

Family: Wife (Sherri), Sons (Daniel, Timothy), Dogs (Maggie, Max) 

Living life: Imperfect Jesus follower 🙏, traveler to new places (3 continents/46 US states/9 Canadian provinces so far) 

Sports: CFL Riders  • NHL Senators  • MLB Red Sox  • NFL Seahawks 

Odd fact: sons born in Red Sox championship years (2004, 2007) 



Brief words on a few necessary course details...

Reaching Me...

Office Hours: 11:50 AM to 1:50 PM on Thursdays (if you need to see me and that time does not work, please let me know and we can set up an alternative time)

Email: I aim to reply to emails sent to me during working hours as quickly as possible. I also check my email occasionally in the evening and on weekends.

To Access Course Resources:

The primary and easiest way to access most course resources is through the course website

<http://www.murrayrice.com/geog-4230.html>

Here you can access many weekly reading resources and course documents, including the syllabus

See the links available here: 

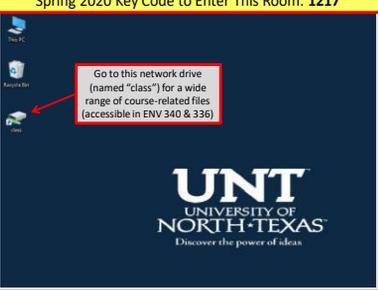
To Access Course Resources:

However, access to some GIS lab resources is through this room and the computer you have in front of you

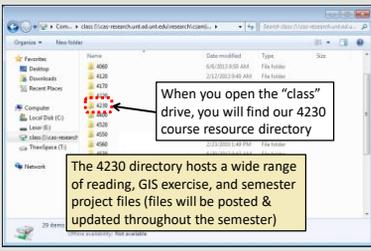
To Access Course Resources:

Spring 2020 Key Code to Enter This Room: 1217

Go to this network drive (named "class") for a wide range of course-related files (accessible in ENV 340 & 336)



To Access Course Resources:



When you open the "class" drive, you will find our 4230 course resource directory

The 4230 directory hosts a wide range of reading, GIS exercise, and semester project files (files will be posted & updated throughout the semester)



What this Course is About

GEOG 4230/5230

Need Filled by This Course

This course fills a specific but important gap in business practice

- **Focus:** application of geographic ideas and methods

People have known that geographic ideas have useful applications for centuries

- **Issue:** hard to actually implement these applications without technology

Need Filled by This Course

Q: what kind(s) of applications of geography to business come to mind? Are there any obvious ones?

- Is there a particular kind of application that draws you to this course? Do you have a picture in your mind of the kinds of tools and problems we will look at this semester?

Need Filled by This Course

Really Basic Example: Customer Mapping

- **Simple application:** (1) take a list of people (clients) and (2) map the list to uncover location patterns

- People could visualize this kind of application hundreds of years ago, but actually doing it is another thing altogether

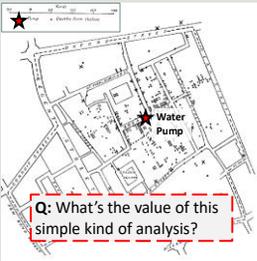
- **Q:** Could you actually do this without computer technology?

Going through an address list, looking up each address, and putting individual pins on a wall map sounds tedious (to say the least).

Then, what if you wanted to update the map?

- ✓ New people
- ✓ Moved people
- ✓ People who **don't belong** on the map anymore

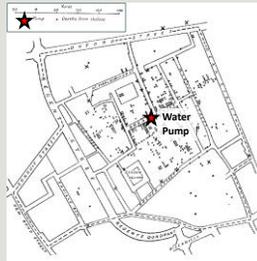
But this difficulty didn't mean that mapping projects like this were never done.



Early example of this exact application: John Snow's 1854 dot map illustrated the cluster of human cholera cases around a water pump in London.

He used his map and statistics to illustrate the connection between the water source and local cholera cases.

Q: What's the value of this simple kind of analysis?



Snow's study was a major step in the development of public health and geography.

It is regarded as a true milestone in the application of geographic thinking and methods to real-world problems.



But it is also true that Snow's study was the exception, rather than the rule (at the time).

The difficulty of mapping large, complex datasets meant that mapping and geographic concepts were not used as often as they could have been.



This doesn't mean that no one else tried, however.

This is a cholera map from almost the same era as John Snow (1849).

<http://spatial.ly/2019/03/mapping-and-visualising-cholera-data/>



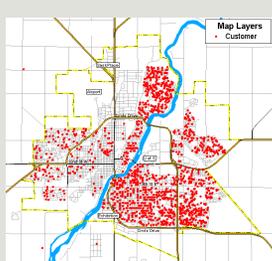
This doesn't mean that no one else tried, however.

And here's another (also from 1849).

<http://spatial.ly/2019/03/mapping-and-visualising-cholera-data/>

Q: so what makes the difference for us?

Geographic Information Systems (GIS): the combination of computer mapping, data storage, and data analysis capabilities, all in one software package.



Modern GIS technology makes it possible for us to implement geographic analyses (even fairly simple ones) that many people could only think about until the last couple of decades.

Here, we generate a basic market share map (using client locations) in seconds

Q: what steps would be necessary to create this kind of map by hand?

GIS: A Powerful Tool

GIS is a powerful tool in two ways

- 1. **Analysis:** producing *data-driven insights* we could not uncover in any other way but through a spatial perspective
- 2. **Communication:** well-designed maps tell a story that people can deeply understand and put to *good application*

Let's watch a [video case study](#) now that illustrates a situation where this "data-driven application" capability makes an important difference: a **telecommunications business example**

GIS: A Powerful Tool

See the "week 1" resources in the "syllabus and handouts" page on the course website for a complementary video case study on a business that many Denton County residents deal with every day:

The CoServ Energy Cooperative

How We Arrived at this Point

Having the technology to do this kind of GIS analysis has taken some long-term effort and technological development

- The following illustrates the timeline along the way in the development and acceptance of GIS capabilities by business in North America

1960s & 1970s: Beginning of "computer cartography"

The article at right: a tribute to Roger Tomlinson, widely credited as the "father of GIS" (for work he did in the 1960s)

From the 1960s to the 1980s, GIS was most widely used in government applications and in academic research

GIS was developing but not yet reaching its true potential

1960s & 1970s: Beginning of "computer cartography"

Sample early GIS output: a Connecticut map produced by a text-only printer

Crude by modern standards, but the potential of computer-based spatial analysis was becoming clear

1987

Late 1980s/early 1990s:
Applications for business GIS technology first appear in the popular media

The article at right: November 1987, first profile of geographic applications in the Minneapolis-St. Paul City Business magazine

Feature: Dr. Ken Smith of Dayton-Hudson, the retailer we know today as Target

As of the late 1980s, few people outside of government and academia had even heard of the combination of maps, data, and technology



1993

Late 1980s/early 1990s:
Applications for business GIS technology first appear in the popular media

Here: first appearance of business GIS in Fortune magazine (another broadly-distributed business publication)

"Mapping for Dollars"

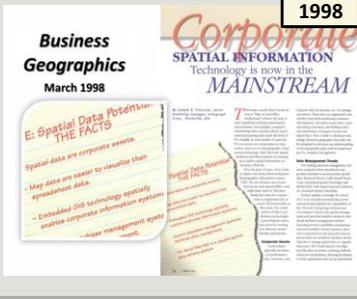


1998

By the late 1990s: Some were arguing that business GIS was now "mainstream" (probably still a bit of an exaggeration at that time)

Here: publication of a dedicated business geography magazine

By this time, business geography was certainly on the road to business acceptance, but the technology was still mainly used by larger businesses (large investment needed to implement)



2005

By the mid 2000s: GIS/geovisualization developments were happening that might not have seemed important to begin with

Here: release of Google Maps in 2005

People initially saw Google Maps as a handy toy for individuals, but it has become so much more: serious business implications



2020

2010s and on: Business GIS reaching wide acceptance

Businesses and non-profits of all sizes using GIS technology

With the growth of Google Maps and a host of location-enabled apps and websites, ordinary people are seeing a broad spectrum of benefits from using geospatial technologies



2020

2010s and on: Business GIS reaching wide acceptance

Businesses and non-profits of all sizes using GIS technology

With the growth of Google Maps and a host of location-enabled apps and websites, ordinary people are seeing a broad spectrum of benefits from using geospatial technologies

Smartphone/tablet apps and services like Uber and GasBuddy have kicked mobile GIS usage into high gear

Q: What location-enabled or location-aware applications have you found to be most useful?

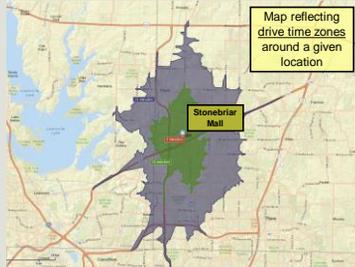
Uber **GasBuddy**



2010s and on: Business GIS reaching wide acceptance

We now have a broad range of GIS analytical capabilities:

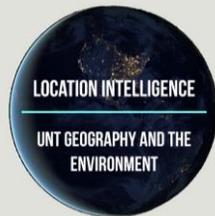
- **Software:** Esri Business Analyst web app output represented here
- **Data:** location features and rich business and market data
- **Businesses:** that understand their need to implement this kind of analysis



Defining GIS

Q: So what picture do we have of GIS and its application with business: what is it exactly?

- Does “computer cartography” (or “computer map making”) cover it?
- If it is more than this, what else is included?



Course and Project Details

GRADING AND EXPECTATIONS FOR THE CLASS

Readings: Course Textbook

- The one bigger course reading not available from the CSAM “4230” directory is the following:
 - Murray D. Rice and Tony Hernandez, editors (2017) *Location Intelligence Research and Applications* (Kent, Ohio: Applied Geography Conference), ISBN: 978-0-991-19751-4
 - Edited book featuring contributions from the top location intelligence researchers over the last two decades
 - This book is available as a free download from [this link](#)

Overall Course Organization

• The grading scheme for this course is simple

- **GIS Labs** (5 in total, take best 3): 30% total
- **Discussion Questions** (4 sets): 20% total
- **Attendance/Participation:** 10% total
- **Semester Applied Project**
 - Written Report – First Phase: 10% (due in early March)
 - Written Report – Second (Final) Phase: 15% (due in late April)
 - Oral Presentation: 15% (due in late April)

Overall Course Organization

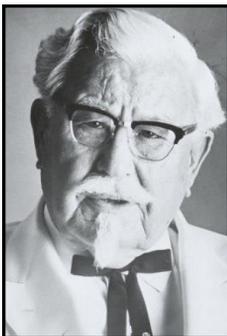
- I hope you have already reviewed the schedule in the syllabus for a weekly breakdown of the course
- **GIS Labs** are spread throughout the course (weeks 3, 6, 8, 9, and 11)
- **The Semester Project** is something you will build throughout the semester (with some major milestone dates)

Discussion Questions

- Every week has a discussion question ("DQ") set for your reference and reflection: see [page 17](#) and following in your 4230 syllabus
- Most weeks you only consider these for your own reference as you prepare for class
- However, for weeks 2, 4, 5, and 7 please complete a [1-2 page write up](#) with your responses and hand in on the Tuesday of each week

Project

- The semester project is a real-world GIS analysis
- Working with the market planning team from KFC, the well-known food services industry leader based in Louisville, Kentucky

Project

- The market planning team from KFC in Louisville and other local business geography leaders will come to Denton to give us insight into our semester project problem
- Simple advice:* treat this project like you are serving a professional client with real goals and needs that matter



Project

So what is the project?



Project

So what is the project? We are supporting KFC's analysis of its new partnership with Walmart

- Idea: KFC has finalized an agreement to develop KFC restaurants in selected Walmart stores



Project

This is a business location analysis problem: which Walmart locations should KFC select?

More complicated than you might think: which Walmart locations and markets are best for KFC in particular?



KFC has a list of Walmart stores they can develop: out of that store list, which locations are the best ones for KFC?




Your semester-long challenge will involve **two major phases**

Phase 1 storyboard proposal: state the problem, define goals for analysis, summarize the relevant GIS methodologies and all data needs
 ➔ **End result:** overall analytical plan (storyboard due March 5)

Phase 2 results: take your plan and do it ➔ **End result:** a report & presentation that lays out the results of the analysis you planned in your phase 1 work (report/presentation due week of April 23)



Your semester-long challenge will involve **two major phases**

Phase 1 proposal ➔ **PLAN THE ANALYSIS**

Phase 2 results ➔ **DO THE ANALYSIS**

Project

- What is KFC's interest in our class completing this project?
 - They want to support your development as business geographers
 - They also want good ideas, and they know it is possible that people in this class might come up with something they have not thought of

Project

- **Class Connection:** Josh Bova, a 2018 UNT graduate, is part of the KFC team that will be working with us
- **Cool fact:** Josh took this class two years ago



Joshua Bova



Josh and his colleague Kurt from KFC's real estate research group will be in our class on Monday, January 28 to fill us in on their take on this project and the top project awards that they have agreed to provide for our class this semester

One More Project Factor

- One key to project success is **data**: getting good information on KFC's competitive situation
 - **Q:** What data do you think could be useful for this project?
 - **One key dataset:** which Walmart locations are available to KFC – will be given to you
 - Most other data defining this situation will be datasets you will need to track down

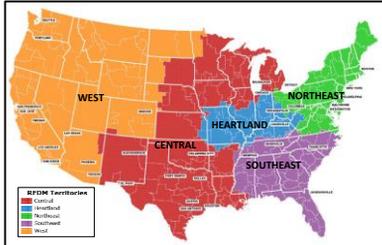
Last word for now on this project...

- Class approach to project groups for this semester
- **GEOG 4230:** project groups (2 students) are encouraged, but not required
 - Please register your project group (or choice to work on your own) with me by the beginning of next week

Each person/project group will have one region from this map that they will be responsible for

One exception: locations and analysis for Texas will be omitted so no one in the class has a "home field" advantage

KFC will provide everyone with a database of Walmart locations that are available to KFC in your analysis region



Here is a document that summarizes the key information you need to know about to start this project





Relevance and Use of Location Intelligence

WHY BUSINESSES NEED TO CARE ABOUT GEOGRAPHY

Location Intelligence

- **Location Intelligence (LI)**: integrates geographic analysis, reasoning, and technology to help leaders in organizations of all kinds make better decisions
- Geography applied to decision-making in an organizational context
- The primary context this course addresses is business, but we always need to recognize that many business applications also address needs for government and non-profit organizations

Location Intelligence and Business Survival

- The development and strategic deployment of various forms of intelligence to understand and manage the business' relationships with its environment is thus one of the most important initiatives a business can engage in
- We argue in this course that location intelligence is central to this
- But must also acknowledge that this external relationship management points to business intelligence more generally

Related Term: Business Intelligence

- **Business intelligence (or "BI")**: an umbrella term
 - Core contribution: identification of patterns and trends in a business' historical data
 - Present results of complex data analysis in a variety of formats to fit the many potential users and decision-makers within a business
 - Focus: improve business decision-making

Related Term: Business Intelligence

- **Business intelligence (or "BI")**: an umbrella term
 - Foundation for BI: raw data in multiple formats, from multiple sources
 - **Q**: What kinds of information can "raw data" include?
- BI is made up of several related activities starting with raw data, including
 - Data querying
 - Data mining
 - Analytical processing
 - Data visualization
 - Reporting

Business Intelligence and Location

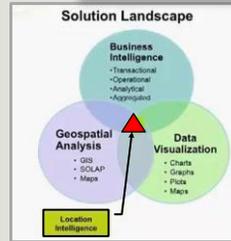
- **Fundamental Reality**: about 80 percent of a business' raw data are geographically significant in some way
- **Businesses**:
 - Already have spatial data (usually combined with other data fields)
 - Need tools to extract the value that exists (or could exist) in these datasets
 - Recognize that spatial data analysis opens up new possibilities for understanding all data fields (geographic data and non-geographic data) that are embedded in a business' datafiles

Business Intelligence and Location

- Q: What are some potential sources of data for business?
 - Customers (often collected by a business at the point of sale)
 - US Census Bureau
 - Other government departments and agencies (federal, state, local)
 - Business organizations (e.g. chambers of commerce)
 - Commercial data providers (businesses like CoStar)
 - Other?

Businesses analyze data from all of these sources because they find real value in doing it

Location adds insight & value to drive improved business outcomes



Location Intelligence sits at a crucial intersection, combining the best features of

1. Business Intelligence,
2. Geospatial Analysis, and
3. Data Visualization

So let's explore the value of location intelligence further...

The Value of Location Intelligence

1. Applies spatial context to inform responses to business opportunities

Q: Why does location information and analysis matter in a situation like this?

What general conclusions might a location analysis for this specific property draw?



The Value of Location Intelligence

1. Applies spatial context to inform responses to business opportunities

Q: How would location information and analysis provide different guidance for this specific situation?



The Value of Location Intelligence

2. The capacity to organize and understand complex data through the use of geographic relationships

Q: What insights can you get from a database in this form?

JCPenney Store Database							
Address	City	State	Shopping Center	Region	GSP(000)	Sales	Date Open
1483 S Central Drive	Andalusia	AL	Freemonting Store	Southeast	99	\$17,854,000	July 28, 2007
1927 River Falls Street	Andalusia	AL	Cowdigan Mall	Southeast	46	\$1,252,000	November 3, 1982
1827 Opelika Road	Auburn	AL	Village Mall	Southeast	17	\$12,404,000	March 3, 2004
4820 Promenade Hwy	Bessemer	AL	Freemonting Store	Southeast	84	\$17,854,000	February 26, 2010
1711 Second Ave NW	Cullman	AL	Cullman SC	Southeast	25	\$17,854,000	November 10, 2016
1800 Commons Drive	Dallas	AL	Wingman Commons Mall	Southeast	86	\$26,254,000	November 7, 1990
4626 Boll Weevil Circle	Enterprise	AL	Enterprise SC	Southeast	39	\$30,523,000	May 2, 1979
105 Cox Creek Pkwy	Florence	AL	Regency Square Mall	Southeast	102	\$26,679,000	January 3, 1979
1363 Loney Pkwy	Fultondale	AL	Freemonting Store	Southeast	83	\$23,101,000	September 26, 2008
1001 Rainbow Drive	Gadsden	AL	Gadsden Mall	Southeast	89	\$17,854,000	September 26, 2008

The Value of Location Intelligence

2. The capacity to organize and understand complex data through the use of geographic relationships

Q: What insights can you get from a database in this form?



The Value of Location Intelligence

3. Organizes business data to reveal the relationship of location to people, events, transactions, facilities, and assets

Q: What are the key elements of this map?
What relationships do you see revealed here?



The Value of Location Intelligence

3. Organizes business data to reveal the relationship of location to people, events, transactions, facilities, and assets

One of several possible analyses: identification of service territories for each DC



The Value of Location Intelligence

Geographic analyses and representations of complex phenomena provide insights that can be seen in no other way

Road Map for the Next Three Weeks

- This course provides an applied overview of advanced LI applications
- But to get there we need to build some fundamental concepts
 - 1. Foundational ideas linking cities, businesses, and geographic analysis (our class discussion in week 2)
 - 2. LI and GIS in a business context (first GIS lab, week 3)
 - 3. Understanding of key data management and acquisition problems and issues (class discussion in week 4)