

GEOG 4230

**Location Intelligence:
Business GIS Concepts and Applications**

Spring, 2018

Tuesday/Thursday 12:30-1:50 pm

ENV 340

Catalog Description: Survey of the geographic concepts and applications that support business decision-making. Examines the context for application of geographic methodologies and explores the analytical techniques that relate to the needs of businesses operating across the global economy. 3 hours.

Course Overview: This course is a survey of the concepts, models, methods, and applications for geographic expertise in contemporary business. Students who are geography majors gain crucial skills by understanding the application of geographic knowledge and expertise in a business setting. Students who are business and retail majors gain new skills by understanding spatial perspectives and analytical methodologies and how they address fundamental questions that are central to business success. Students in all majors benefit from learning how geographic tools meet practical business needs.

Prerequisite(s): Junior standing or permission of the instructor.

Instructor: Dr. Murray D. Rice

Office: ENV 310G

Telephone: (940) 565-3861

E-Mail: rice@unt.edu (general contacts or
class submissions)

Class: Tue/Thu 12:30-1:50pm

Classroom: ENV 340

Office Hours: Tue, 10:00 am – 12:00 pm (or
by appointment)



Class Web Site:

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

Class Directory (for applied assignment materials): R-Drive “Class” directory,
“4230” subdirectory (accessible on computers in CSAM lab rooms)

Grading: It is not essential to pass any particular exam, lab, or project to pass the course, but relative success in each will impact your final grade.

Applied GIS Exercises:	Five GIS Lab Weeks (see schedule; 5 x 10%)	50%
Discussion Questions	Two Sets Submitted (weeks 2 and 5; 2 x 5%)	10%
Classroom Participation	Overall Attendance / Discussion Contribution	5%
Semester Applied Project:	Written Report: First Phase (week 8)	10%
	Written Report: Final (week 14)	15%
	Oral Presentation (week 14)	10%

The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with an accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the Office of Disability Accommodation website at <http://www.unt.edu/oda>. You may also contact them by phone at 940.565.4323.

Course Text: The required textbook for this course is Murray D. Rice and Tony Hernandez (2017) *Location Intelligence Research and Applications* (Applied Geography Conference), ISBN: 978-0-991-19751-4 (free book download, details provided in class). An optional textbook that provides supplementary information on some of the course topics is Richard L. Church and Alan T. Murray (2009) *Business Site Selection, Location Analysis, and GIS* (Wiley), ISBN: 978-0-470-19106-4. Other secondary readings are required and listed by week in the schedule portion of this syllabus. Details on access to all readings will be announced in class. The course's "Further Reading" page gives a good start on accessing a wide variety of resources related to the course (see <http://www.murrayrice.com/li-further-reading>).

Late Policy: Anything handed in late will be subject to an immediate 10% penalty. Late work will not be accepted after graded work has been handed back to the class. Graded work is usually returned to the class one week after the due date. I will grant exceptions to the above if you provide documentation substantiating a valid personal emergency.

- *Please note:* it is your responsibility to come to me with an explanation if a personal emergency prevents you from handing in an exercise or report on time.

Attendance: I encourage full attendance since the in-class experience is a crucial component of learning in this course. I will not take attendance in this course on a regular basis, but persistent non-attendance may result in your being withdrawn from the course with a grade of WF.

Extra Credit: The Department of Geography does not allow extra credit assignments (work not specified on a course syllabus).

Semester Applied Project: You will be asked to form a group of 2-3 students to complete two reports (including a *first phase report* and a *final report*) and an oral presentation on an applied, location intelligence case study topic in business geography. I expect that you will handle this project with maximum professionalism: to succeed, you will think of this as not just another “term project”, but as a report that you are producing for an actual business client. Everything you write in your report and plan for presentation should indicate that you have put your best effort forward.

Your project will focus on an applied case study problem involving business geography analysis and assessment. Please consider the following points as you plan your project.

The term project for this class is a complete geographic analysis and assessment for a real-world business that will be introduced during the first week of classes this semester. Industry contacts will meet with the class early in the semester and periodically thereafter to help to introduce the case study, define the project parameters, and provide general insight into the project problem and situation.

The focus of the case study will be a specific, actual business that is a client in need of geographic analysis and advice to guide their future plans. You will be filling the role of a location intelligence analyst in completing your project work. This project will give you an excellent introduction to the connection between geography and real-world business problems through this project. Because you are working with an actual business, you will have an abundance of real-world information about the business that you will need to consider in combination with the concepts and methods we are learning in this class.

There are two written reports associated with the project, and one final oral presentation.

1. The *first phase report* focuses on an initial environmental scan of the project problem, including a first level of geographic analysis.
2. The *final report* will cover the entire project and focus on crafting actionable recommendations for the business client.
3. The *oral presentation* will provide a high level overview of your findings and provide an opportunity for discussion of your results.

To succeed in this project, you will need to think carefully about the role you are playing in this case study, the case study business itself, its locations and its markets. A few questions to consider: What are the business and your industry contacts trying to accomplish – and following from that, what are you really trying to accomplish in your analysis? Where is the case study business currently located? What geographic factors contribute to success for this business? Who are its customers? Where are they located? Who are the business’ key competitors? Where are they located? How is this competitive situation changing over time?

Last thought: the focus of your report should be on geography and the analytical considerations the case study business needs to make related to locations and markets. You will find that the skills you gain using *Maptitude*, *ArcGIS*, *Business Analyst*, and *Business Analyst Online* will also be useful in completing your case study analysis.

It is important that you begin planning and working on your project immediately: you will find you need the entire semester to complete the project.

Course Schedule

Please read the following schedule carefully. Please note that all weeks marked **DQ** have a discussion question set due on the *Tuesday* of that week. Also, all weeks marked **GIS** will see our class time focused on GIS lab work (task-oriented meetings, minimal class discussion time). All weeks not spent on GIS lab activities will focus on class discussion and concept exploration.

Readings: the readings for each week come from the required Rice and Hernandez (2017) textbook, plus more readings accessible through the course website (details on access to these readings will be provided the first day of class). Readings from the optional Church and Murray (2009) textbook are identified by [*text that is italicized and delimited by square brackets*].

- Additionally, please review the Caliper *Maptitude Brochure*, Esri *Business Analyst Online Brochure* and *Business Analyst Online Report Reference Guide* before the beginning of week 4 (the start of our GIS lab sessions). These documents (linked on the course “Further Reading” page) will give you some idea of the spectrum of applications that can be addressed using the GIS packages we will use in this course.
- Also, please note that I will work to schedule guest speakers from our local business geography practitioner community through the semester. These talks are not represented in the schedule here, but I will update you during the semester as I make these arrangements. I anticipate you will find these external contacts to be a valuable part of your course experience.

WEEK

TOPIC

PART 1 – INTRODUCTION: GEOGRAPHY AND BUSINESS DECISION-MAKING

1 (Jan 16, 18)

Location Intelligence: Motivation and Fundamentals

Rice and Hernandez (2017) Chapter 1 “Location Intelligence as an Evolving Field”; [*Church and Murray (2009) Chapter 1 “Introduction”*]; See all week 1 resources on the course website’s “Syllabus and Handouts” page

- Introduction to course goals and context for location intelligence expertise in society
- Meaning of the “location intelligence” and “business geography” terms
- Discussion of GIS applications in a business context

PART 2 – CONCEPTUAL FOUNDATIONS OF BUSINESS GEOGRAPHIC ANALYSIS

2 (Jan 23, 25)

Foundations: Urban/Economic Geography

DQ

Rice and Hernandez (2017) Chapter 5 “Public Sector”; Rodrigue, Comtois, and Slack (2006) Chapter 3 “Economic and Spatial Structure of Transport Systems” and Chapter 7 “Urban Transportation”*; See all week 2 resources on the “Syllabus and Handouts” page

Discussion Question Set Due This Week (Tuesday)

- Overview of selected foundational concepts in economic geography that support business geography practice
- Discussion of key urban concepts and how geographers conceptualize the city

3 (Jan 30, Feb 1)

Applied GIS Exercise 1: GIS and Urban/Economic Analysis

GIS

No reading for this week.

- *Hands-on Lab*: restaurant performance assessment and analysis
- *Software Focus*: Caliper Maptitude GIS

4 (Feb 6, 8)

Foundations: Geography, Business, and Data Science

Longley et al. (2005) Chapter 12 “Data Quality”; [Church and Murray (2009) Chapter 2 “GIS”]; See all week 4 resources on the “Syllabus and Handouts” page

Applied Exercise 1 Due This Week (Thursday)

- Business applications for data analysis
- Geography, business, and the contributions and meaning of data science
- Understanding and properly navigating through data quality and data acquisition issues

* Instructions to be provided in class on how to access these documents.

PART 3 – APPLICATION DOMAINS FOR GIS AND GEOANALYTICS

5 (Feb 13, 15)

The Retail and Service Domain: Site Selection, Trade Area

Analysis, and the Identification of Business Opportunity DQ

Rice and Hernandez (2017) Chapter 2 “Services”; Jones and Simmons (1990) Chapter 11 “Trade Area Analysis”*; Esri (2012) *Improving Retail Performance with Location Analytics*.* [Church and Murray (2009) Chapter 4 “Trade and Service Areas”]; See all week 5 resources on the “Syllabus and Handouts” page

Discussion Question Set Due This Week (Tuesday)

- Geographic analysis and business: site selection and trade area analysis
- Applications in competitive strategy for retail business

6 (Feb 20, 22)

Applied GIS Exercise 2: Retail Location Analysis

GIS

No reading for this week.

- *Hands-on Lab*: pharmacy network location-allocation analysis case study
- *Software Focus*: Esri ArcGIS (Network Analyst Extension)

7 (Feb 27, Mar 1)

The Marketing Domain: Customer Analysis

Esri (2011) *Tapestry Segmentation Reference* (1-12)*; See all week 7 resources on the “Syllabus and Handouts” page

Applied Exercise 2 Due This Week (Thursday)

- General context for marketing application: management of uncertainty
- Market analysis application: The Huff Model
- Market analysis application: Geodemographic Segmentation

8 (Mar 6, 8)

Applied GIS Exercise 3: Marketing and

Geodemographic Analytics

GIS

No reading for this week.

Written Report (First Phase of Semester Applied Project) Due This Week (Tuesday)

- On Tuesday this week, please hand in to me:
 - A paper version and an electronic version of your first phase report (electronic version to rice@unt.edu)
- *Hands-on Lab*: geodemographic targeting case study analysis
- *Software Focus*: Esri Business Analyst Web App
- *Project (First Phase)*: General Discussion (Thursday)

* Instructions to be provided in class on how to access these documents.

Mar 12-16

Spring Break: No Classes (Enjoy Your Week!)

9 (Mar 20, 22)

The Transportation and Logistics Domain: Supply Chain Management and Spatial Analytics

Rice and Hernandez (2017) Section 2.3 “Transportation”; Rodrigue, Comtois, and Slack (2006) Chapter 2 “Transportation Systems and Networks”*; Longley et al. (2005) Chapter 59 “Transportation GIS: GIS-T”; [Church and Murray (2009) Chapter 9 “Coverage”]; See all week 9 resources on the “Syllabus and Handouts” page

Applied Exercise 3 Due This Week (Thursday)

- The bases of spatial interaction
- JCPenney: A case study of the role of transportation and logistics in the modern corporation
- Modeling and analyzing transportation networks
- Further exploration of location-allocation methodological options
- GIS and transport routing

10 (Mar 27, 29)

Applied GIS Exercise 4: Transportation Analysis

GIS

No reading for this week.

- *Hands-on Lab*: distribution center network location analysis in a chain retailer
- *Software Focus*: Esri ArcGIS (Network Analyst Extension)

11 (Apr 3, 5)

The Healthcare Domain: Spatial Analysis of Health Needs and Medical Services

Rice and Hernandez (2017) Chapter 5 “Public Sector”; Longley et al. (2005) Chapter 66 “Health and Health Care Applications”

Applied Exercise 4 Due This Week (Thursday)

- Spatial epidemiology and the incidence of disease
- Health care system planning in a spatial context

* Instructions to be provided in class on how to access these documents.

12 (Apr 10, 12)

Applied GIS Exercise 5: Healthcare Analytics

GIS

No reading for this week.

- *Hands-on Lab*: health clinic location and community vulnerability analysis
- *Software Focus*: Caliper Maptitude GIS

PART 4 – COURSE WRAP-UP: FINAL CONCEPTS AND PROJECT PRESENTATIONS

13 (Apr 17, 19)

GIS and Business Location Analytics

Longley et al. (2005) Chapter 51 “GIS for Business and Service Planning”* ; See all week 13 resources on the “Syllabus and Handouts” page

Applied Exercise 5 Due This Week (Thursday)

- Overall discussion of issues with GIS applications in business
- Semester project consultation and work time

14 (Apr 24, 26)

Project Presentations

No reading this week

Written Report (Final) and Oral Presentations This Week

- Project presentations this week (no other activities planned)
- On Tuesday this week, please email to me:
 - A paper version and an electronic version of your first phase report (electronic version to rice@unt.edu)
 - An electronic version of your presentation file (rice@unt.edu)
- On the day you present (Tuesday or Thursday), please hand in to me at the beginning of class:
 - A paper version of your presentation

PART 5 – COURSE CONCLUSION

15 (May 1, 3)

Summary and Synthesis

No reading this week

- Summary and review of key course concepts and applications
- Return of graded projects and presentation of best project award

* Instructions to be provided in class on how to access these documents.

Sources Referenced in the Course Reading List

Each of the following books and other publications provide excellent background reading for this course. We will examine selected chapters from each book listed in this course, along with our required course textbooks. Some marked readings are available through links on the course website. Aside from the Church and Murray course textbook, none of the books listed below are available in the UNT bookstore, but copies of most are available through online retailers such as Amazon. The Rice and Hernandez course textbook is available through the Applied Geography Conference website (link provided on course website).

Caliper (2017) *Mapitude Brochure*. Caliper: Newton, MA.

Church, Richard, and Alan Murray (2009) *Business Site Selection, Location Analysis, and GIS*. Wiley: New York.

Esri (2011) *Tapestry Segmentation Reference*. Esri: Redlands, CA.

Esri (2012) *Business Analyst Online Brochure*. Esri: Redlands, CA.

Esri (2012) *Improving Retail Performance with Location Analytics*. Esri: Redlands, CA.

Esri (2012) *Business Analyst Online Report Reference Guide*. Esri: Redlands, CA.

Esri (2013) *Location Analytics for Insurance*. Esri: Redlands, CA.

Jones, Ken, and Jim Simmons (1990) *The Retail Environment*, Routledge: London. ISBN: 0-415-04985-7

Jones, Ken, and Jim Simmons (1993) *Location, Location, Location: Analyzing the Retail Environment*, 2nd Edition, Nelson Canada: Scarborough. ISBN: 0-17-604140-0

Longley, P.A., M.F. Goodchild, D.J. Maguire, and D.W. Rhind, editors (2005) *New Developments in Geographical Information Systems: Principles, Techniques, Management and Applications*, 2nd Edition. Wiley: Hoboken, NJ.

Rice, Murray D., and Tony Hernandez (2017) *Location Intelligence Research and Applications*. Applied Geography Conference: Kent, OH.

Rodrigue, Jean-Paul, Claude Comtois, and Brian Slack (2006) *The Geography of Transport Systems*, 1st Edition. Routledge: London.

Discussion Questions

Please note: you are responsible for handing in the discussion questions for the two weeks marked “DQ” in the course schedule (weeks 2 and 5). For each of the other weeks with questions provided, please read, reflect on, and answer for yourself the DQs for that week before coming to class.

Week 1: Location Intelligence – Motivation and Fundamentals

1. Your chapter 1 reading from the *Location Intelligence* course textbook makes the case that geography as a broad field of study and application is much more important than its low public profile might indicate. For example, even though geographers occupy many important jobs in business and government, almost none of them have a position title that includes the words “geography” or “geographer”. Why do you think many people in society as a whole have only a vague idea of what geography is all about?
2. What kind(s) of applications of geography to business come to mind as we start this course? Are there any ones that you think are particularly obvious? Is there a particular kind of application that particularly interests you?

Week 2: Foundations – Urban/Economic Geography

DQ

1. Your chapter 5 reading from the *Location Intelligence* course textbook argues that it is important to acknowledge the many kinds of actors that are involved in urban/economic issues
 - a. public (governmental),
 - b. private (for-profit business), and
 - c. non-profit (charities, foundations, non-governmental organizations)Think of one example from each of these three organizational categories that plays an important role in shaping what happens in a city (or cities). Name each organization you cite and indicate the role you see the organization playing in the life of the city.
2. Your chapter 7 reading from the *Geography of Transport Systems* textbook spends some time exploring the interaction between transportation and the form of the city (or in other words the overall plan of where in the city we can find each major urban land use, such as commercial activities, residential spaces, public facilities, and parks). What difference has the evolution of transport technologies made for urban form? (see pages 171-176 in particular)

Week 3: Applied Exercise 1 – GIS and Urban/Economic Analysis

1. In general, what kinds of problems do our cities and business communities most need to solve? Thinking of this same question in another way,
 - a. What issues have the biggest impact on quality of life in our cities?
 - b. What issues are holding our business community back the most?Thinking of these key urban/economic problems, which do you think GIS technology in particular would be most useful in solving?
2. What are the GIS capabilities you see illustrated in the exercise you are doing this week?

Week 4: Foundations – Geography, Business, and Data Science

1. In 2004, Wal-Mart had 460 terabytes of business data stored at its Bentonville, Arkansas headquarters. This is a huge amount of data. However, today Wal-Mart collects five times as much data from its global operations every hour. The data management challenge Wal-Mart faces (along with other businesses) is immense.
 - a. What data fields and types of information would you think Wal-Mart would be interested in collecting in its database?
 - b. Which areas of Wal-Mart’s business do you think this information might come from? (think of Wal-Mart’s total, global operations)
 - c. What might be the data sources Wal-Mart can draw upon? (internal, external)
 - d. Can you think of any associated issues/biases/legal implications? Any causes for concern?
2. The online reading “What Data Quality Matters – Now More Than Ever” (see syllabus and handouts page, week 4) makes the case for why we need to care about data quality using three case situations to illustrate the importance of criticizing, analyzing, and scaling your data. What are the key take-aways that impact you from this article?

Week 5: The Retail and Service Domain: Site Selection, Trade Area Analysis, and the Identification of Business Opportunity

DQ

1. Retail is one of the most established areas of application for geographic thinking and analysis: geographers have been contributing solutions to retail businesses for decades. Why do you think the retail environment presents such an obvious application venue for geographic analysis?
2. The Esri StoryMap “Retail Scenario – Merchandising” (see syllabus and handouts page, week 5) illustrates a retail location problem and its solution. In your own words, what is the problem addressed in this scenario, what are the key elements of the analysis, and what are the results produced in this story map?

Week 6: Applied Exercise 2 – Retail Location Analysis

1. In general, what kinds of problems from the broad retail application area do you think GIS would be most useful in solving?
2. What are the specific GIS capabilities you see illustrated in the exercise you are doing this week?

Week 7: Marketing Domain – Customer and Market Analytics

Geodemography is a branch of market research that assigns the attributes of small areas – such as census tracts, block groups, or sometimes zip codes – to the consumers who live within them. Based on this assignment, geodemography divides the consumer marketplace into meaningful segments that are locatable and reachable.

1. Some people have seen the rise of massive datasets containing detailed consumer behavior information (“Big Data”) as a sign that the usefulness of geodemography is coming to an end. The online blog entry “10 Reasons to Use Geodemography” argues this is not so. Which of these reasons do you see as most powerful, and why?
2. Does geography offer a helpful contribution when an organization possesses a detailed consumer behavior database? Reflect on and briefly describe a potential application for geographic analysis in such a situation.

Week 8: Applied Exercise 3 – Geodemographic Market Analysis

1. In general, what kinds of problems from the broad marketing application area do you think GIS would be most useful in solving?
2. What are the specific GIS capabilities you see illustrated in the exercise you are doing this week?

Week 9: Transportation and Logistics Domain – Supply Chain Management and Spatial Analytics

1. You can view an animated map of global air travel over a 24-hour period here:

https://www.youtube.com/watch?v=yx7_yzypm5w

What spatial patterns do you see in the video? Can you draw any conclusions about the patterns you see?

2. The Esri StoryMap “Supply Chain Analysis” illustrates the contribution of geographic analysis to decision-making in a business setting focused on product distribution. In your own words, summarize the situation addressed in this StoryMap and the steps used in the associated analysis. What is the value that a geographic perspective brings to this sample analysis?

Week 10: Applied Exercise 4 – Transportation Analysis on a Network

1. In general, what kinds of problems from the broad transportation and logistics application area do you think GIS would be most useful in solving?
2. What are the specific GIS capabilities you see illustrated in the exercise you are doing this week?

Week 11: Healthcare Domain – Spatial Analytics for Health Needs and Medical Services

1. What interactions have you had with the healthcare system in the US?
 - a. What healthcare stories have you seen?
 - b. What perceptions do you have of healthcare in the US?
 - c. What strengths do you see? Weaknesses?
2. What do you know about the healthcare system in other countries? Positives, negatives?

Week 12: Applied Exercise 5 – Healthcare Analytics

1. In general, what kinds of problems from the broad health and medical application area do you think GIS would be most useful in solving?
2. What are the specific GIS capabilities you see illustrated in the exercise you are doing this week?

Week 13: GIS and Business Location Analytics

A key issue impacting many geographers is the fact that is difficulty for us to explain the value of location because it is so obvious to us.

1. How might we start to engage with this question – are there specific answers or examples we can give that can clarify the value of a geographic perspective for business?
2. How and why does geography contribute value to an organization?
 - a. Why should ExxonMobil care about location and distribution?
 - b. What about the Texas Department of Agriculture?
 - c. The American Red Cross? Amazon?
 - d. Any other institution you can name?

My goal in this course is for your time here to be of great value to you. This course provides concepts and skills you will find a helpful starting-point for a career in location intelligence and business geography. However, even if you follow a career path outside of business geography, my hope is that this course will provide you with insights into cities and the economy that can help you in many ways.

Please do not hesitate to let me know if there is anything else we can do, beyond what you see in this course package, that could be useful in preparing you for your future.