Course:	**GCU 442/542: Geographical Analysis of Transportation** **Fall Semester, 2014**
Schedule Line #:	78388 (GCU 442); 79706 (GCU 542)
Time:	Tues-Thurs, 9:00–10:15 AM
Location:	Room: ED 204
Professor:	**Dr. Michael Kuby, Professor** Coor 5568, Phone: 965-6850 email: mikekuby@asu.edu http://geoplan.asu.edu/kuby
Office Hours:	Tuesdays 2:00-3:30 PM, Friday 11:00 AM – noon, or by appointment
Required Readings:	Hanson, Susan and Genevieve Giuliano (eds). 2004. *The Geography of Urban Transportation*, Third Edition. New York: Guilford Publications. Text is available in the following formats from the ASU bookstore: New--$86.25; Used--$64.75; Rental New--$64.69; Rental Used--$47.44, or from Amazon and other sites. Also available as a pdf e-book for $72.25 at http://www.guilford.com/cgi-bin/search.cgi?type=dir&pattern=geo/trans. A selection of journal articles and book chapters available on Blackboard are also required.

Course Summary. This course examines the geographical aspects of transportation systems. It looks at the geography of networks, transport costs and rates, different modes of transport, trade, economic development, and technology. We will study the movement of freight and passengers at the individual, urban, national, and international scales. We will focus especially on air transportation, mass transit, and energy.

Transportation geography has two themes. The first is transportation and spatial organization. This includes both how transportation is organized geographically, and how transportation organizes other human activities. Examples of the spatial organization of transportation include networks, corridors, hierarchies, hinterlands, intermodal connections, and so on. Examples of the spatial aspects of human society and economy that transportation helps to organize are land use patterns, industrial location, urban hierarchies, information flows, shopping, regional development, and trade. We will study the different approaches are used to describe and explain transportation and spatial organization, including conceptual, graphical, historical, and empirical. Each of these approaches are, in their own way, attempts to tell a story about the changing spatial patterns of transportation.

The second theme of transportation geography is applied real-world problem-solving. The approach is quantitative and overlaps with the disciplines of planning and engineering. Our goal will be to understand these models at the conceptual level and the introductory mathematical level. At the "conceptual" level, you will be expected to know about each model's purpose, its inputs and outputs, and its assumptions, strengths, and limitations. At the "introductory mathematical" level, you will be expected to know what the parameters and variables stand for, and why its "functional form" makes sense.

Learning Outcomes. After taking this class, students should be able to:

- Understand and explain the main concepts and theories in transport geography, such as time-space convergence, location theory, hinterlands, network development, international trade, transport demand management, and the relationships between transport and land use.
- Use transport cost terminology properly.
- Know the advantages and disadvantages of each mode of transport for moving freight and passengers.
- Discuss how transport has evolved historically, the effects transport developments have had on the spatial economy and other societal issues, and the role of technology, economics, and policy on transport history.
- Understand the steps in the basic four-step urban transportation modeling system, as well as its strengths and weaknesses and alternatives.
- Assess the prospects for mass transit by understanding the factors that contribute to its success.
- Discuss the sustainability of different transport systems and modes and the energy use and environmental impacts.
- Understand how GIS can be used in transportation analysis, and be able to perform some basic GIS-T analyses.
- Understand the parameters of a spatial interaction (gravity) model and apply it to predicting flow volumes.
- Use linear programming to solve a basic problem to minimize transport costs.

Class Attendance and Participation. Students are expected to come to class having read the readings and be prepared to discuss and answer questions about the readings.

Readings. You are expected to read all the chapters and articles and come to class ready to discuss them. In addition to the book, there are a number of supplemental readings from other sources. All of the supplemental readings are available from the Library Resources section of the Blackboard site for free.

Homework Exercises. The course includes four hands-on computer exercises. We will do large parts of the labs in class, but you may need to complete them after class. Some of the labs can be done as a group project. No previous modeling, programming, or GIS experience is assumed beyond basic computer literacy. Labs will be held in the SGSUP computer lab in COOR 191—not in our regular classroom.

Term Paper. Graduate students are required to write a term paper on a topic of their choice. Topics must be approved by me in advance. Guidelines are available on Blackboard. Minimum length is 10 pages. If time permits, grad students will make short oral presentations of their findings during the last week of the semester.

Exams. There will be one midterm exam and one final exam. The final exam will be cumulative for the semester, with an emphasis on the second half. Make-up exams will be allowed only if the student has approved it with me in advance of the test. If you can't reach me by phone, you can e-mail me or call the School of Geographical Sciences and Urban Planning office (965-7533). I will require confirmation of your excuse via valid written proof (e.g., doctor's note or receipt, copy of traffic ticket, funeral announcement, etc.).

Grades.
Your final grade is based on a weighted average as follows:

	Undergrads	**Grad Students**
4 Homework Exercises	4 x 10%=40%	4 x 10%=40%
Term Paper	*none*	20%
1 Midterm Exam	25%	20%
1 Final Exam	35%	20%
TOTAL	**100%**	**100%**

Class Schedule. Dates are tentative and subject to change as necessary.

Week	**Date**	**Topic**	**Required Readings** (please read it *by* the date indicated) **Also Project Due Dates**
0	Thurs. Aug. 21	Course Overview Introduction to Transportation Geography	
1	Tues. Aug 26	Transportation, Spatial Organization, and Transport History	• Hanson & Giuliano: Chs. 1-2
	Thurs. Aug. 28	Transportation Costs and Benefits	• Kuby Powerpoint • Hanson & Giuliano: Ch. 11; Ch. 12, pp. 332-345.
2	Tues. Sept. 2	Transportation Costs and Benefits	
	Thurs. Sept. 4	Case Study 1: Air Transport Deregulation and Hubs	• Button (2002) • Goetz and Vowles (2009)
3	Tues. Sept. 9	Air Transport continued Case Study 2: Ports and Containerization	• Tierney and Kuby (2008) • Wynne (2011) • Kuby and Reid (1992)
	Thurs. Sept. 11	Classical Location Theory	• Taaffe, Gauthier & O'Kelly: Ch. 2 • Kuby Powerpoint
4	Tues. Sept. 16	Classical Location Theory	
	Thurs. Sept. 18	Transport Optimization Models	• Taaffe, Gauthier, & O'Kelly: Ch. 10 (grad only)
5	Tues. Sept. 23	**Transport Optimization Lab** **MEET IN COOR 191**	• Linear Programming Handout • **Bring USB drive with Xpress software installed**
	Thurs. Sept. 25	Trade Theory	• **Grad Student Term Paper Outlines Due**
6	Tues. Sept. 30	Network Analysis and Graph Theory	• **Optimization Lab Due** • Kuby, Roberts, Upchurch, Tierney (2009)
	Thurs. Oct. 2	**GIS Lab** **Road Corridor Planning** **MEET IN COOR 191**	• Hanson & Giuliano: Ch. 7 • ADOT (2013) • Holstege (2013)
7	Tues. Oct. 7	GIS Lab Debriefing Review for Midterm Exam	• **GIS Road Corridor Lab 1 Due**
	Thurs. Oct. 9	**MIDTERM EXAM**	

Week	Date	Topic	**Required Readings** (please have it read for the class indicated) **Also Project Due Dates**
8	Tues. Oct. 14	**Fall Break – no class**	
	Thurs. Oct. 16	GIS Network Topology and Shortest Paths	• Rodrigue (2014) Network Data Models • **http://video.esri.com/watch/1834/arcgis-network-analystcreating-network-datasets**
9	Tues. Oct. 21	**GIS Network Topology and Shortest Paths Lab** **MEET IN COOR 191**	
	Thurs. Oct. 23	Urban Transportation and Urban Form	• Hanson & Giuliano: Ch. 3 • Hanson & Giuliano: Ch. 8 • Hanson & Giuliano: Ch. 9
10	Tues. Oct. 28	Urban Transportation and Urban Form	• **GIS Network Topology Lab Due**
	Thurs. Oct. 30	Urban Transportation Modeling	• Hanson & Giuliano: Ch. 5 • Hanson & Giuliano: Ch. 6
11	Tues. Nov. 4	Trip Generation Models Trip Distribution Models	• Taaffe, Gauthier&O'Kelly: Ch. 7 (grad and undergrad) • Taaffe, Gauthier&O'Kelly: Ch. 11 (grad only)
	Thurs. Nov. 6	**Gravity Model Lab** **MEET IN COOR 191**	
12	Tues. Nov. 11	**Veteran's Day - No Class**	
	Thurs. Nov. 13	Modal Split Traffic Assignment	
13	Tues. Nov. 18	Critiques of and Alternatives to 4-Step Modeling Time-Space Prisms	• **Gravity Model Lab Due**
	Thurs. Nov. 20	Transport, Energy, and the Environment	• Hanson & Giuliano: Ch. 10 • Mann (2013) • Sarewitz and Pielke (2013) • *U.S. Annual Energy Review* (2014) or • *BP Statistical Review of World Energy* (2014)
14	Tues. Nov. 25	Transport, Energy, and the Environment	• Hanson & Giuliano: Ch. 14 • Sperling & Gordon (2008)
	Thurs. Nov. 27	**Thanksgiving – no class**	
15	Tues. Dec. 2	Transport, Energy, and the Environment	• Gilbert & Perl (2007) • Kelley & Kuby (2013)
	Thurs. Dec. 4	Transport, Energy, and the Environment	• Hanson & Giuliano: Ch. 13 • Schwartz et al. (2014) National Climate Assessment, Chapter 5 on Transportation
	Fri. Dec. 5		• **Grad Student Term Papers Due**
	Thurs. Dec. 11 7:30-9:20 AM	**FINAL EXAM**	

Required Supplemental Readings

Downloadable or linked from the Library Resources section of our Blackboard course site.

ADOT. 2013. South Mountain Freeway (Loop 202) *Draft Environmental Impact Study*. Phoenix: ADOT.

British Petroleum. 2014. *Statistical Review of World Energy*: http://www.bp.com/en/global/corporate/about-bp/energy-economics/statistical-review-of-world-energy.html.

Button, Kenneth. 2002. Debunking some common myths about airport hubs. *Journal of Air Transport Management* 8: 177-188.

ESRI. 2012. *ArcGIS Network-Creating Network Datasets:* http://video.esri.com/watch/1834/arcgis-network-analystcreating-network-datasets. (video)

Gilbert, Richard and Anthony Perl. 2007. Grid-connected vehicles as the core of future land-based transport systems. *Energy Policy* 35: 3053–3060.

Goetz, Andrew and Timothy M. Vowles. 2009. The good, the bad, and the ugly: 30 years of U.S. airline deregulation. *Journal of Transport Geography* 17: 251-263.

Holstege, Sean. 2013. Report: South Mountain Freeway would help Phoenix air quality, April 26, 2013: www.azcentral.com/community/ahwatukee/articles/20130426south-mountain-freeway-environmental-impact-statement.html.

Kelley, Scott and Michael Kuby. 2013. On the way or around the corner? Observed refueling choices of alternative-fuel drivers in Southern California. Accepted for publication in *Journal of Transport Geography.*

Kuby, Michael and Neil Reid. 1992. Technological Change and the Concentration of the U.S. Liner Port System: 1970-88. *Economic Geography* 69: 272–289.

Kuby, Michael J., Tyler D. Roberts, Christopher D. Upchurch, Sean Tierney. 2009. Network Analysis. In Kitchin R, Thrift N (eds) *International Encyclopedia of Human Geography*, Volume 7, pp. 391-398. Oxford: Elsevier.

Mann, Charles C. 2013. What If We Never Run Out of Oil? *Atlantic Monthly* 311(4): 48-63 (www.theatlantic.com/magazine/archive/2013/05/what-if-we-never-run-out-of-oil/309294/).

Rodrigue, J-P *et al.* 2014. *The Geography of Transport Systems*, Section on Network Data Models: http://people.hofstra.edu/geotrans/eng/methods/ch2m3en.html.

Sarewitz, Daniel and Roger Pielke Jr. 2013. Learning to Live with Fossil Fuels. *Atlantic Monthly* 311(4): 59. (www.theatlantic.com/magazine/archive/2013/05/learning-to-live-with-fossil-fuels/309295/).

Schwartz, Henry G., Michael Meyer, Cynthia J. Burbank, Michael Kuby, Clinton Oster, John Posey, Edmond J Russo, Arthur Rypinski. 2014. Transportation. Chapter 5 in *National Climate Assessment.* Washington: U.S. Global Change Research Program: http://nca2014.globalchange.gov/report/sectors/transportation.

Sperling, Daniel and Deborah Gordon. 2008. *Two Billion Cars: Transforming a Culture. TR News* (Nov.-Dec.): 3-9.

Taaffe, Edward J., Howard L. Gauthier, and Morton E. O'Kelly. 1996. *Geography of Transportation* (2nd. ed.). Saddle River, NJ: Prentice-Hall. (Chapters 2 and 7 only)

Tierney, Sean, and Michael Kuby. 2008. Airline and Airport Choice by Passengers in Multi-Airport Regions: The Effect of Southwest Airlines. *Professional Geographer* 60(1): 15–32.

U.S. Energy Information Administration. 2012. *Annual Energy Review*: http://www.eia.gov/totalenergy/data/annual/.

Wynne, Richard. 2011. Geographic Dimensions of Airline Network Development or...The World is (Not Completely) Flat. Presentation at Association of American Geographers Annual Meeting, Seattle, WA, April 14.