

Term Information

Effective Term Spring 2023

General Information

Course Bulletin Listing/Subject Area Geography
Fiscal Unit/Academic Org Geography - D0733
College/Academic Group Arts and Sciences
Level/Career Graduate
Course Number/Catalog 6286
Course Title GIS in Social and Business Research
Transcript Abbreviation GIS SOCIAL BUS RES
Course Description This course is designed to help students grasp advanced GIS methods for applications in business and social science using rich geographic and demographic data sets.
Semester Credit Hours/Units Fixed: 3

Offering Information

Length Of Course 14 Week
Flexibly Scheduled Course Never
Does any section of this course have a distance education component? Yes
Is any section of the course offered 100% at a distance
Greater or equal to 50% at a distance
Grading Basis Letter Grade
Repeatable No
Course Components Lecture
Grade Roster Component Lecture
Credit Available by Exam No
Admission Condition Course No
Off Campus Never
Campus of Offering Columbus

Prerequisites and Exclusions

Prerequisites/Corequisites GEOG 5210, or consent of instructor.
Exclusions
Electronically Enforced Yes

Cross-Listings

Cross-Listings

Subject/CIP Code

Subject/CIP Code 45.0701
Subsidy Level Professional Course
Intended Rank Masters, Doctoral

Requirement/Elective Designation

Required for this unit's degrees, majors, and/or minors

Course Details

Course goals or learning objectives/outcomes

- Use various data sources such as census data and public transit feeds
- Understand the theoretical background of various spatial analysis methods
- Analyze the pros and cons of different methods for applications
- Develop basic data processing tools using programming languages like Python
- Conduct data analytical research for business or social science project
- Present and defend their methodological choices for applications

Content Topic List

- Introduction to census geographies and demography
- Accessibility
- Mobility
- Trade area analysis
- Spatial interaction models for transportation and land use
- Hot spot and clustering
- Geocoding, accuracy, and privacy
- Spatial smoothing and areal interpolation
- Location-allocation models
- Environmental justice
- Aggregation, segregation, and scale
- Regionalization
- Healthcare applications

Sought Concurrence

No

Attachments

- GEOG6286-inperson-geodemography.docx: Syllabus (in-person)
(Syllabus. Owner: Xiao, Ningchuan)
- GEOG6286-asctech-review.docx: ASCTech review (online)
(Other Supporting Documentation. Owner: Xiao, Ningchuan)
- GEOG6286-online-geodemography.docx: ASCTech review (online)
(Syllabus. Owner: Xiao, Ningchuan)
- GEOG6286-inperson-geodemography-v2.docx: Syllabus (in-person) - revised
(Syllabus. Owner: Xiao, Ningchuan)
- GEOG6286-online-geodemography-v2.docx: Syllabus (online) - revised
(Syllabus. Owner: Xiao, Ningchuan)

Comments

- Responses to contingencies:

The calendar is now on a day-by-day basis. Assignments are due in a week, which is now stated in the Assignment information section.

Page range for each reading is in the list of readings (end of the syllabus), and the total page for each week is now included in the schedule.

The course meets two 80-minute sessions per week, now stated on the first page.

More detailed descriptions are added for all assignments in the Assignment information section.

The quizzes are open book and students use Carmen to access the questions and submit their answers, as described in the Assignment information section.

Previous comments are deleted due to limit on length. *(by Xiao, Ningchuan on 01/20/2022 11:56 PM)*

- Please see Panel feedback e-mail sent 12/03/21. *(by Cody, Emily Kathryn on 12/03/2021 02:31 PM)*

Workflow Information

| Status | User(s) | Date/Time | Step |
|--------------------|---|---------------------|------------------------|
| Submitted | Xiao, Ningchuan | 11/08/2021 11:46 PM | Submitted for Approval |
| Approved | Xiao, Ningchuan | 11/08/2021 11:47 PM | Unit Approval |
| Approved | Vankeerbergen, Bernadette Chantal | 11/12/2021 09:34 AM | College Approval |
| Revision Requested | Cody, Emily Kathryn | 12/03/2021 02:31 PM | ASCCAO Approval |
| Submitted | Xiao, Ningchuan | 01/20/2022 11:56 PM | Submitted for Approval |
| Approved | Xiao, Ningchuan | 01/20/2022 11:57 PM | Unit Approval |
| Approved | Vankeerbergen, Bernadette Chantal | 01/23/2022 06:44 PM | College Approval |
| Pending Approval | Cody, Emily Kathryn Jenkins, Mary Ellen Bigler Hanlin, Deborah Kay Hilty, Michael Vankeerbergen, Bernadette Chantal Steele, Rachel Lea | 01/23/2022 06:44 PM | ASCCAO Approval |



THE OHIO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

SYLLABUS: GEOG 6286

GIS IN SOCIAL AND BUSINESS RESEARCH (ONLINE)

SPRING 2022

Course overview

Instructor

Instructor: Ningchuan Xiao

Email address: xiao.37@osu.edu

Phone number: 614-292-4072

Office hours: by appointment only (CarmenZoom)

Office Location: 1132 Derby Hall

Course description

This course is positioned in today's world where geospatial is in the driver's seat of constantly forwarding technology advances. This course is designed to help students grasp advanced GIS methods for applications in business and social science using rich geographic and demographic data sets. We strike to balance among three fundamental goals of in-depth and theoretical discussions of critical methods, empirical understanding of how these methods will be used in business cases and social science applications, and hands-on exercises of data collection and method development.

This class meets twice a week for two 80-minute sessions.

Course learning outcomes

By the end of this course, students should successfully be able to:

- Use various data sources such as census data and public transit feeds
- Understand the theoretical background of various spatial analysis methods
- Analyze the pros and cons of different methods for applications
- Develop basic data processing tools using programming languages like Python

- Conduct data analytical research for business or social science project
- Present and defend their methodological choices for applications

How this course works

Mode of delivery: This course is 100% online. There are no required sessions when you must be logged in to Carmen at a scheduled time.

Pace of online activities: This course is divided into **weekly modules** that are released one week ahead of time. Each module is organized around a specific topic (see course schedule below) and consists of introduction videos, coding tutorials, and student activities (see assignment information below). Students are expected to keep pace with weekly deadlines but may schedule their efforts freely within that time frame.

Credit hours and work expectations: This is a 3-credit-hour course. According to [Ohio State policy](#), a 3 credit hour course comprises 3 hours of instruction in class (including online instruction content and Carmen activities) and 6 hours of homework/study time outside class per week, for a total of 9 hours per course per week, for the student to earn a C grade.

GE Course Information

- This is not a GE course

Prerequisites

GEOG 5210, or consent of instructor.

Course materials

Required

Wang, F. 2014. *Quantitative Methods and Socio-Economic Applications in GIS*. 2nd Edition. Boca Raton, FL: CRC Press.

There are more required readings that are listed after the course schedule.

Course technology

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at <https://ocio.osu.edu/help/hours>, and support for urgent issues is available 24x7.

- **Self-Service and Chat support:** <http://ocio.osu.edu/selfservice>
- **Phone:** 614-688-HELP (4357)
- **Email:** 8help@osu.edu
- **TDD:** 614-688-8743

Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
- Navigating Carmen

Technology skills necessary for this specific course

- CarmenZoom text, audio, and video chat
- Collaborating in CarmenWiki
- Recording a slide presentation with audio narration
- Recording, editing, and uploading video

Necessary equipment

- Computer: current Mac (OS X) or PC (Windows 7+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed
- Microphone: built-in laptop or tablet mic or external microphone

Necessary software

- [OpenOffice](https://www.openoffice.org/privacy.html) is a free and complete suite of software tools for word processing, spreadsheet, and presentations. View their privacy statement at <https://www.openoffice.org/privacy.html>.
- [Microsoft Office 365 ProPlus](https://www.microsoft.com/education/office365) All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft's Student Advantage program. Each student can install Office on five PCs or Macs, five tablets (Windows, iPad® and Android™) and five phones.
 - Students are able to access Word, Excel, PowerPoint, Outlook and other programs, depending on platform. Users will also receive 1 TB of OneDrive for Business storage.
 - Office 365 is installed within your BuckeyeMail account. Full instructions for downloading and installation can be found <https://ocio.osu.edu/kb04733>.
- [Python](https://www.python.org/privacy/): students will install Python 3 and necessary libraries on their own computers and detailed instructions will be provided. The privacy policy for Python can be found at <https://www.python.org/privacy/>.
- ArcGIS Pro: OSU students can either install ESRI's software on their own computer or through our lab computers. For instructions of installing ArcGIS Pro, please visit the web page at <https://cura.osu.edu/esri#arcgis-pro>. Please refer to below about how to access

our lab computers through RemoteLab. This is provided through ESRI's Education Site License Program and you may review ESRI's privacy policies at <https://www.esri.com/en-us/privacy/overview>. For information about accessibility, visit [Accessibility in ArcGIS Pro](#).

- **QGIS** is a powerful and fully fledged GIS package. It is free and open-source and is widely used in many enterprise applications. You can download the software from here: <https://qgis.org/en/site/forusers/download.html>. Students can install this on their own computer or use the installations on our lab computers through RemoteLab (see below).
- RemoteLab is a remote desktop access platform provided for OSU students to access computers in our computer labs at remotelab.osu.edu. It is a workaround if installation on your own computers does not work. More instructions about RemoteLab can be found at [this Google Doc](#).

Grading and faculty response

Grades

| Assignment or category | Points |
|------------------------|--------|
| Weekly exercises | 50 |
| Term project | 20 |
| Quizzes | 20 |
| Participation | 10 |
| Total | 100 |

Assignment information

Weekly exercises. The course is generally organized on a weekly basis and assignments will be given for students to practice and learn about each week's topic. Exercises will include both hands-on experiments using actual data and software tools or writing to summarize reading materials. For hands-on experiments, we will either use our own tutorials or other existing book chapters to discuss how GIS can be used to solve problems discussed in the module. Students will then solve a similar problem using their own data. Exercises are due in one week, unless otherwise specified.

Term project. Each student will work on an individual project using or extending the methods learned in this class on a business or social science problem. The timeline of the project is

detailed in the course schedule, which includes the following deliverables: a short project proposal, an early report of the project, and a final report and presentation. Each student will write a final project report and make a 10-minute video presentation of the project. Each project will also be peer reviewed by at least two students.

Quizzes. There will be three quizzes throughout the semester. Quizzes are not cumulative and will only cover new materials. Quizzes are open book that will include both standardized questions as well as problem-solving questions. The problem-solving questions will provide some sample datasets and ask students to use GIS to solve a problem as discussed in the class. Students will use Carmen to access the questions and submit their answers.

Participation. Each student will be assigned to peer review two or more term projects. Evaluation rubric will be provided for these peer reviews.

Late assignments

Late submissions will be accepted up to a week past the due date. One day late will incur a 10% penalty. Two days late will incur 20% penalty. Three days will incur a 30% penalty. Four days late will incur a 40% penalty. Five to seven days late will only receive 50% credit of the grade you would have received if it was submitted on time. If you contact me ahead of time for deadline adjustments you will not incur any penalty. Please refer to Carmen for due dates.

Grading scale

93–100: A
 90–92.9: A-
 87–89.9: B+
 83–86.9: B
 80–82.9: B-
 77–79.9: C+
 73–76.9: C
 70–72.9: C-
 67–69.9: D+
 60–66.9: D
 Below 60: E

Faculty feedback and response time

I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call **614-688-HELP** at any time if you have a technical problem.)

Grading and feedback

For large weekly assignments, you can generally expect feedback within **7 days**.

E-mail

I will reply to e-mails within **24 hours on school days**.

Discussion board

I will check and reply to messages in the discussion boards every **24 hours on school days**.

Attendance, participation, and discussions

Student participation requirements

Because this is a distance-education course, your attendance is based on your online activity and participation. The following is a summary of everyone's expected participation:

- **Logging in: AT LEAST TWICE PER WEEK**
Be sure you are logging in to the course in Carmen each week, including weeks with holidays or weeks with minimal online course activity. (During most weeks you will probably log in many times.) If you have a situation that might cause you to miss an entire week of class, discuss it with me *as soon as possible*.
- **Office hours and live sessions: OPTIONAL OR FLEXIBLE**
All live, scheduled events for the course, including my office hours, are optional. For live presentations, I will provide a recording that you can watch later. If you are required to discuss an assignment with me, please contact me at the beginning of the week if you need a time outside my scheduled office hours.
- **Participating in peer review: FINAL PROJECTS**
Each student will review two or more term projects at the end of the semester.

Discussion and communication guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style:** While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. Informality (including an occasional emoticon) is fine for non-academic topics.
- **Tone and civility:** Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online.
- **Citing your sources:** When we have academic discussions, please cite your sources to back up what you say. (For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.)

- **Backing up your work:** Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.

Other course policies

Academic integrity policy

- **Quizzes and exams:** You must complete the midterm and final exams yourself, without any external help or communication. Weekly quizzes are included as self-checks without points attached.
- **Written assignments:** Your written assignments, including discussion posts, should be your own original work. In formal assignments, you should follow Chicago style to cite the ideas and words of your research sources. You are encouraged to ask a trusted person to proofread your assignments before you turn them in--but no one else should revise or rewrite your work.
- **Reusing past work:** In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you've explored in previous courses, please discuss the situation with me.
- **Falsifying research or results:** All research you will conduct in this course is intended to be a learning experience; you should never feel tempted to make your results or your library research look more successful than it was.
- **Collaboration and informal peer-review:** The course includes many opportunities for formal collaboration with your classmates. While study groups and peer-review of major written projects is encouraged, remember that comparing answers on a quiz or assignment is not permitted. If you're unsure about a particular situation, please feel free just to ask ahead of time.

Ohio State's academic integrity policy

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

Copyright disclaimer

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes

associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Statement on title IX

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at <http://titleix.osu.edu> or by contacting the Ohio State Title IX Coordinator, Kellie Brennan, at titleix@osu.edu

Accessibility accommodations for students with disabilities

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Accessibility of course technology

This online course requires use of Carmen (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- [Carmen \(Canvas\) accessibility](#)
- Streaming audio and video
- Synchronous course tools

Your mental health!

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the

aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614- 292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273- TALK or at suicidepreventionlifeline.org

Course schedule (tentative)

| Week | Dates | Topics, Readings, Assignments |
|------|-------|--|
| 1 | 1/11 | Introduction to census geographies and demography Readings: Gre02, Spe12 [37 pages] |
| | 1/13 | Exercises: getting started with census data |
| 2 | 1/18 | Accessibility Readings: Kwa99, Wan14 c.5 [38 pages] |
| | 1/20 | Exercises: measuring spatial accessibility |
| 3 | 1/25 | Mobility Readings: CMS+16, MPC19 [38 pages] |
| | 1/27 | Exercises: GTFS feeds for public transit |
| 4 | 2/1 | Trade area analysis Readings: Huff03, Wan14 c.4 [35 pages] |
| | 2/3 | Exercises: Huff model and its applications Term project: Proposal |
| 5 | 2/8 | Spatial interaction models for transportation and land use Readings: RT04 (optional), AP16, Wan14 c.10 [32 or 66 pages] |

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| | 2/10 | Exercises: simulating urban population and land use Quiz 1 |
| 6 | 2/15 | Hot spot and clustering Readings: Ans95 (optional), Wan14 c.8 [37 or 60 pages] |
| | 2/17 | Exercises: local Moran's I |
| 7 | 2/22 | Geocoding, accuracy, and privacy Readings: RAG+06, KR18, SJT16 [44 pages] |
| | 2/24 | Writing: accuracy and privacy of geospatial data |
| 8 | 3/1 | Spatial smoothing and areal interpolation Readings: Xie95, EB01 (optional), YMS09 (optional), Wan14 c.3 [39 or 79pages] |
| | 3/3 | Exercises: dasymetric mapping |
| 9 | 3/8 | Location-allocation models Readings: XM19, Wan14 c.11 [47 pages] |
| | 3/10 | Exercises: locating a new coffee shop |
| 10 | 3/14-3/18 | Spring break (no class) |
| 10 | 3/22 | Environmental justice Readings: Bow02, PRMS10 [31 pages] |
| | 3/24 | Writing: environment justice, a summary Quiz 2 |
| 11 | 3/29 | Aggregation, segregation, and scale Readings: LRF+08, RMO+08 [56 pages] |

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| | 3/31 | Writing: why or why not aggregate? Term project: Early report |
| 12 | 4/5 | Regionalization Readings: Mar98, Wan14 c.9 [34 pages] |
| | 4/7 | Exercises: making your own geographies |
| 13 | 4/12 | Healthcare applications Readings: MH09, Wan14 c.5, 11 [49 pages] |
| | 4/14 | Exercises: access to healthcare Quiz 3 |
| 14 | 4/19 | Work on your final project |
| | 4/21 | Project final report and video presentations |

List of Readings

[Ans95] Anselin, L. 1995. Local indicators of spatial association – LISA. *Geographical Analysis* 27(2): 93-115.

[AP16] Arbia, G. and Petrarca, F., 2016. Effects of scale in spatial interaction models. In *Spatial Econometric Interaction Modelling* (pp. 85-101). Springer.

[Bow02] Bowen, W. 2002. An Analytical Review of Environmental Justice Research: What Do We Really Know? *Environmental Management* 29(1): 3-15.

[CMS+16] Chen, C., Ma, J., Susilo, Y., Liu, Y. and Wang, M., 2016. The promises of big data and small data for travel behavior (aka human mobility) analysis. *Transportation research part C: emerging technologies*, 68, pp.285-299.

[EB01] Eicher, C. L., and Brewer, C. A. (2001). Dasymetric mapping and areal interpolation: implementation and evaluation. *Cartography and Geographic Information Science*, 28(2), 125-138.

[Gre02] Gregory, I.N., 2002. The accuracy of areal interpolation techniques: standardising 19th and 20th century census data to allow long-term comparisons. *Computers, environment and urban systems*, 26(4), pp.293-314.

- [Huff03] Huff, D. 2003. Parameter estimation in the Huff Model. *ArcUser*. October, 34-36.
- [KR18] Kounadi, O. and Resch, B., 2018. A geoprivacy by design guideline for research campaigns that use participatory sensing data. *Journal of Empirical Research on Human Research Ethics*, 13(3), pp.203-222.
- [Kwa99] Kwan, M.-P. 1999. Gender and individual access to urban opportunities: a study using space-time measures. *Professional Geographer* 51(2): 210-227.
- [LRF+08] Lee, B. A., Reardon, S. F., Firebaugh, G., Farrell, C. R., Matthews, S. A., and O'Sullivan, D. 2008. Beyond the census tract: Patterns and determinants of racial segregation at multiple geographic scales. *American Sociological Review* 73(5): 766-791.
- [Mar98] Martin, D. 1998. Optimizing census geography: the separation of collection and output geographies. *International Journal of Geographical Information Science*, 12(7): 673-685.
- [MH09] McGrail, M.R. and Humphreys, J.S., 2009. Measuring spatial accessibility to primary care in rural areas: improving the effectiveness of the two-step floating catchment area method. *Applied Geography*, 29(4), pp.533-541.
- [MPC19] Mourad, A., Puchinger, J. and Chu, C., 2019. A survey of models and algorithms for optimizing shared mobility. *Transportation Research Part B: Methodological*, 123, pp.323-346.
- [PRMS10] Pearce, J.R., Richardson, E.A., Mitchell, R.J. and Shortt, N.K., 2010. Environmental justice and health: the implications of the socio-spatial distribution of multiple environmental deprivation for health inequalities in the United Kingdom. *Transactions of the Institute of British Geographers*, 35(4), pp.522-539.
- [RAG+06] Rushton, G., Armstrong, M.P., Gittler, J., Greene, B.R., Pavlik, C.E., West, M.M. and Zimmerman, D.L. 2006. Geocoding in cancer research: a review. *Annual Review of Preventive Medicine* 20(2S): S16-S24.
- [RMO+08] Reardon, S. F., Matthews, S. A., O'Sullivan, D., Lee, B. A., Firebaugh, G., Farrell, C. R., and Bischoff, K. 2008. The geographic scale of metropolitan racial segregation. *Demography*, 45(3): 489-514.
- [RT04] Roy, J.R., and Thill, J.-C. 2004. Spatial interaction modelling. *Papers in Regional Science* 83: 228-361.
- [SJT16] Seidl, D.E., Jankowski, P. and Tsou, M.H., 2016. Privacy and spatial pattern preservation in masked GPS trajectory data. *International Journal of Geographical Information Science*, 30(4), pp.785-800.

[Spe12] Sperling, J., 2012. The tyranny of census geography: Small-area data and neighborhood statistics. *Cityscape*, pp.219-223.

[Wan14] Wang, F. 2014. *Quantitative Methods and Socio-Economic Applications in GIS*. 2nd Edition. Boca Raton, FL: CRC Press.

[Xie95] Xie, Y. 1995. The overlaid network algorithms for areal interpolation problem. *Computers, environment and urban systems*, 19(4), 287-306.

[XM19] Xiao, N. and Murray, A.T., 2019. Spatial optimization for land acquisition problems: A review of models, solution methods, and GIS support. *Transactions in GIS*, 23(4), pp.645-671.

[YMS09] Young, C., Martin, D. and Skinner, C. 2009. Geographically intelligent disclosure control for flexible aggregation of census data. *International Journal of Geographical Information Science* 23(4):457-482.



THE OHIO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

SYLLABUS: GEOG 6286

GIS IN SOCIAL AND BUSINESS RESEARCH

SPRING 2022

Course overview

Instructor

Instructor: Ningchuan Xiao

Email address: xiao.37@osu.edu

Phone number: 614-292-4072

Office hours: Monday and Wednesday, 10-11:30 AM or by appointment

Office Location: 1132 Derby Hall

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GE Course Information

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Prerequisites

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Course materials

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Grading and faculty response

Grades

| Assignment or category | Points |
|------------------------|--------|
| Weekly exercises | 50 |
| Term project | 20 |
| Quizzes | 20 |
| Participation | 10 |
| Total | 100 |

Assignment information

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Participation. Students are required to attend the course lectures and actively participate in-class discussions. Each student will also be assigned to peer review two or more term projects. Evaluation rubric will be provided for these peer reviews.

Late assignments

Late submissions will be accepted up to a week past the due date. One day late will incur a 10% penalty. Two days late will incur 20% penalty. Three days will incur a 30% penalty. Four days late will incur a 40% penalty. Five to seven days late will only receive 50% credit of the grade you would have received if it was submitted on time. If you contact me ahead of time for deadline adjustments you will not incur any penalty. Please refer to Carmen for due dates.

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83–86.9: B
80–82.9: B-
77–79.9: C+
73–76.9: C
70–72.9: C-
67–69.9: D+
60–66.9: D
Below 60: E

Faculty feedback and response time

I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call **614-688-HELP** at any time if you have a technical problem.)

Grading and feedback

For large weekly assignments, you can generally expect feedback within **7 days**.

E-mail

I will reply to e-mails within **24 hours on school days**.

Discussion board

I will check and reply to messages in the discussion boards every **24 hours on school days**.

Other course policies

Academic integrity policy

- **Quizzes and exams:** You must complete the midterm and final exams yourself, without any external help or communication. Weekly quizzes are included as self-checks without points attached.
- **Written assignments:** Your written assignments, including discussion posts, should be your own original work. In formal assignments, you should follow Chicago style to cite the ideas and words of your research sources. You are encouraged to ask a trusted person to proofread your assignments before you turn them in--but no one else should revise or rewrite your work.
- **Reusing past work:** In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you've explored in previous courses, please discuss the situation with me.
- **Falsifying research or results:** All research you will conduct in this course is intended to be a learning experience; you should never feel tempted to make your results or your library research look more successful than it was.
- **Collaboration and informal peer-review:** The course includes many opportunities for formal collaboration with your classmates. While study groups and peer-review of major written projects is encouraged, remember that comparing answers on a quiz or assignment is not permitted. If you're unsure about a particular situation, please feel free just to ask ahead of time.

Ohio State's academic integrity policy

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

Copyright disclaimer

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Statement on title IX

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at <http://titleix.osu.edu> or by contacting the Ohio State Title IX Coordinator, Kellie Brennan, at titleix@osu.edu

Accessibility accommodations for students with disabilities

The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Accessibility of course technology

This online course requires use of Carmen (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- [Carmen \(Canvas\) accessibility](#)
- Streaming audio and video
- Synchronous course tools

Your mental health!

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614- 292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273- TALK or at suicidepreventionlifeline.org

Course schedule (tentative)

| Week | Dates | Topics, Readings, Assignments |
|------|-------|--|
| 1 | 1/11 | Introduction to census geographies and demography Readings: Gre02, Spe12 [37 pages] |
| | 1/13 | Exercises: getting started with census data |
| 2 | 1/18 | Accessibility Readings: Kwa99, Wan14 c.5 [38 pages] |
| | 1/20 | Exercises: measuring spatial accessibility |
| 3 | 1/25 | Mobility Readings: CMS+16, MPC19 [38 pages] |
| | 1/27 | Exercises: GTFS feeds for public transit |
| 4 | 2/1 | Trade area analysis Readings: Huff03, Wan14 c.4 [35 pages] |
| | 2/3 | Exercises: Huff model and its applications Term project: Proposal |
| 5 | 2/8 | Spatial interaction models for transportation and land use Readings: RT04 (optional), AP16, Wan14 c.10 [32 or 66 pages] |
| | 2/10 | Exercises: simulating urban population and land use Quiz 1 |
| 6 | 2/15 | Hot spot and clustering Readings: Ans95 (optional), Wan14 c.8 [37 or 60 pages] |
| | 2/17 | Exercises: local Moran's I |

| | | |
|----|-----------|--|
| 7 | 2/22 | Geocoding, accuracy, and privacy Readings: RAG+06, KR18, SJT16 [44 pages] |
| | 2/24 | Writing: accuracy and privacy of geospatial data |
| 8 | 3/1 | Spatial smoothing and areal interpolation Readings: Xie95, EB01 (optional), YMS09 (optional), Wan14 c.3 [39 or 79pages] |
| | 3/3 | Exercises: dasymetric mapping |
| 9 | 3/8 | Location-allocation models Readings: XM19, Wan14 c.11 [47 pages] |
| | 3/10 | Exercises: locating a new coffee shop |
| 10 | 3/14-3/18 | Spring break (no class) |
| 10 | 3/22 | Environmental justice Readings: Bow02, PRMS10 [31 pages] |
| | 3/24 | Writing: environment justice, a summary Quiz 2 |
| 11 | 3/29 | Aggregation, segregation, and scale Readings: LRF+08, RMO+08 [56 pages] |
| | 3/31 | Writing: why or why not aggregate? Term project: Early report |
| 12 | 4/5 | Regionalization Readings: Mar98, Wan14 c.9 [34 pages] |
| | 4/7 | Exercises: making your own geographies |

| | | |
|----|------|---|
| 13 | 4/12 | Healthcare applications Readings: MH09, Wan14 c.5, 11 [49 pages] |
| | 4/14 | Exercises: access to healthcare Quiz 3 |
| 14 | 4/19 | Work on your final project |
| | 4/21 | Project final report and video presentations |

List of Readings

[Ans95] Anselin, L. 1995. Local indicators of spatial association – LISA. *Geographical Analysis* 27(2): 93-115.

[AP16] Arbia, G. and Petrarca, F., 2016. Effects of scale in spatial interaction models. In *Spatial Econometric Interaction Modelling* (pp. 85-101). Springer.

[Bow02] Bowen, W. 2002. An Analytical Review of Environmental Justice Research: What Do We Really Know? *Environmental Management* 29(1): 3-15.

[CMS+16] Chen, C., Ma, J., Susilo, Y., Liu, Y. and Wang, M., 2016. The promises of big data and small data for travel behavior (aka human mobility) analysis. *Transportation research part C: emerging technologies*, 68, pp.285-299.

[EB01] Eicher, C. L., and Brewer, C. A. (2001). Dasymetric mapping and areal interpolation: implementation and evaluation. *Cartography and Geographic Information Science*, 28(2), 125-138.

[Gre02] Gregory, I.N., 2002. The accuracy of areal interpolation techniques: standardising 19th and 20th century census data to allow long-term comparisons. *Computers, environment and urban systems*, 26(4), pp.293-314.

[Huff03] Huff, D. 2003. Parameter estimation in the Huff Model. *ArcUser*. October, 34-36.

[KR18] Kounadi, O. and Resch, B., 2018. A geoprivacy by design guideline for research campaigns that use participatory sensing data. *Journal of Empirical Research on Human Research Ethics*, 13(3), pp.203-222.

[Kwa99] Kwan, M.-P. 1999. Gender and individual access to urban opportunities: a study using space-time measures. *Professional Geographer* 51(2): 210-227.

- [LRF+08] Lee, B. A., Reardon, S. F., Firebaugh, G., Farrell, C. R., Matthews, S. A., and O'Sullivan, D. 2008. Beyond the census tract: Patterns and determinants of racial segregation at multiple geographic scales. *American Sociological Review* 73(5): 766-791.
- [Mar98] Martin, D. 1998. Optimizing census geography: the separation of collection and output geographies. *International Journal of Geographical Information Science*, 12(7): 673-685.
- [MH09] McGrail, M.R. and Humphreys, J.S., 2009. Measuring spatial accessibility to primary care in rural areas: improving the effectiveness of the two-step floating catchment area method. *Applied Geography*, 29(4), pp.533-541.
- [MPC19] Mourad, A., Puchinger, J. and Chu, C., 2019. A survey of models and algorithms for optimizing shared mobility. *Transportation Research Part B: Methodological*, 123, pp.323-346.
- [PRMS10] Pearce, J.R., Richardson, E.A., Mitchell, R.J. and Shortt, N.K., 2010. Environmental justice and health: the implications of the socio-spatial distribution of multiple environmental deprivation for health inequalities in the United Kingdom. *Transactions of the Institute of British Geographers*, 35(4), pp.522-539.
- [RAG+06] Rushton, G., Armstrong, M.P., Gittler, J., Greene, B.R., Pavlik, C.E., West, M.M. and Zimmerman, D.L. 2006. Geocoding in cancer research: a review. *Annual Review of Preventive Medicine* 20(2S): S16-S24.
- [RMO+08] Reardon, S. F., Matthews, S. A., O'Sullivan, D., Lee, B. A., Firebaugh, G., Farrell, C. R., and Bischoff, K. 2008. The geographic scale of metropolitan racial segregation. *Demography*, 45(3): 489-514.
- [RT04] Roy, J.R., and Thill, J.-C. 2004. Spatial interaction modelling. *Papers in Regional Science* 83: 228-361.
- [SJT16] Seidl, D.E., Jankowski, P. and Tsou, M.H., 2016. Privacy and spatial pattern preservation in masked GPS trajectory data. *International Journal of Geographical Information Science*, 30(4), pp.785-800.
- [Spe12] Sperling, J., 2012. The tyranny of census geography: Small-area data and neighborhood statistics. *Cityscape*, pp.219-223.
- [Wan14] Wang, F. 2014. *Quantitative Methods and Socio-Economic Applications in GIS*. 2nd Edition. Boca Raton, FL: CRC Press.
- [Xie95] Xie, Y. 1995. The overlaid network algorithms for areal interpolation problem. *Computers, environment and urban systems*, 19(4), 287-306.

[XM19] Xiao, N. and Murray, A.T., 2019. Spatial optimization for land acquisition problems: A review of models, solution methods, and GIS support. *Transactions in GIS*, 23(4), pp.645-671.

[YMS09] Young, C., Martin, D. and Skinner, C. 2009. Geographically intelligent disclosure control for flexible aggregation of census data. *International Journal of Geographical Information Science* 23(4):457-482.

Arts and Sciences Distance Learning Course Component Technical Review Checklist

Course: Geog 6286

Instructor: Ningchuan Xiao

Summary: Geodemography: GIS in Social Science and Business Research

| Standard - Course Technology | Yes | Yes with Revisions | No | Feedback/Recomm. |
|---|-----|--------------------|----|---|
| 6.1 The tools used in the course support the learning objectives and competencies. | X | | | <ul style="list-style-type: none"> • Office 365 • Carmen • Python • ArcGIS • QGIS • RemoteLab |
| 6.2 Course tools promote learner engagement and active learning. | X | | | <ul style="list-style-type: none"> • CarmenZoom • CarmenWiki • Carmen Discussion Boards |
| 6.3 Technologies required in the course are readily obtainable. | X | | | All tools are available via OSU site license free of charge. |
| 6.4 The course technologies are current. | X | | | All are updated regularly. |
| 6.5 Links are provided to privacy policies for all external tools required in the course. | | X | | Please include all privacy policies (when such exists) for all 3 rd party tools (Python, ArcGIS, QGIS). |
| Standard - Learner Support | | | | |
| 7.1 The course instructions articulate or link to a clear description of the technical support offered and how to access it. | X | | | Links to 8HELP are provided |
| 7.2 Course instructions articulate or link to the institution's accessibility policies and services. | X | | | a |
| 7.3 Course instructions articulate or link to an explanation of how the institution's academic support services and resources can help learners succeed in the course and how learners can obtain them. | X | | | b |
| 7.4 Course instructions articulate or link to an explanation of how the institution's student services and resources can help learners succeed and how learners can obtain them. | X | | | c |
| Standard – Accessibility and Usability | | | | |
| 8.1 Course navigation facilitates ease of use. | X | | | Recommend using the Carmen Distance Learning "Master Course" template developed by ODEE and available in the Canvas Commons to provide student-users with a consistent user experience in terms of navigation and access to course content. |
| 8.2 Information is provided about the accessibility of all technologies required in the course. | | X | | Please include all accessibility policies (when such exists) for all 3 rd party tools (Python, ArcGIS, QGIS). |
| 8.3 The course provides alternative means of access to course materials in formats that meet the needs of diverse learners. | X | | | Instructions are provided to obtain materials in another format. |
| 8.4 The course design facilitates readability | X | | | |
| 8.5 Course multimedia facilitate ease of use. | X | | | All assignments and activities that use the Carmen LMS with embedded multimedia facilitates ease of use. All other multimedia resources facilitate ease of |

| | | | | |
|--|--|--|--|---|
| | | | | use by being available through a standard web browser |
|--|--|--|--|---|

Reviewer Information

- Date reviewed: 7/13/20
- Reviewed by: Ian Anderson

Notes: Just a few issues with policy statements.

^aThe following statement about disability services (recommended 16 point font):
Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone 614- 292-3307, slds@osu.edu; slds.osu.edu.

^bAdd to the syllabus this link with an overview and contact information for the student academic services offered on the OSU main campus.
<http://advising.osu.edu/welcome.shtml>

^cAdd to the syllabus this link with an overview and contact information for student services offered on the OSU main campus. <http://ssc.osu.edu>. Also, consider including this link in the "Other Course Policies" section of the syllabus.