LSU | **College of Art + Design**

LA 4201 & 7075 | **GIS for Designers**

Brendan Harmon
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Fall 2020 Design 217.
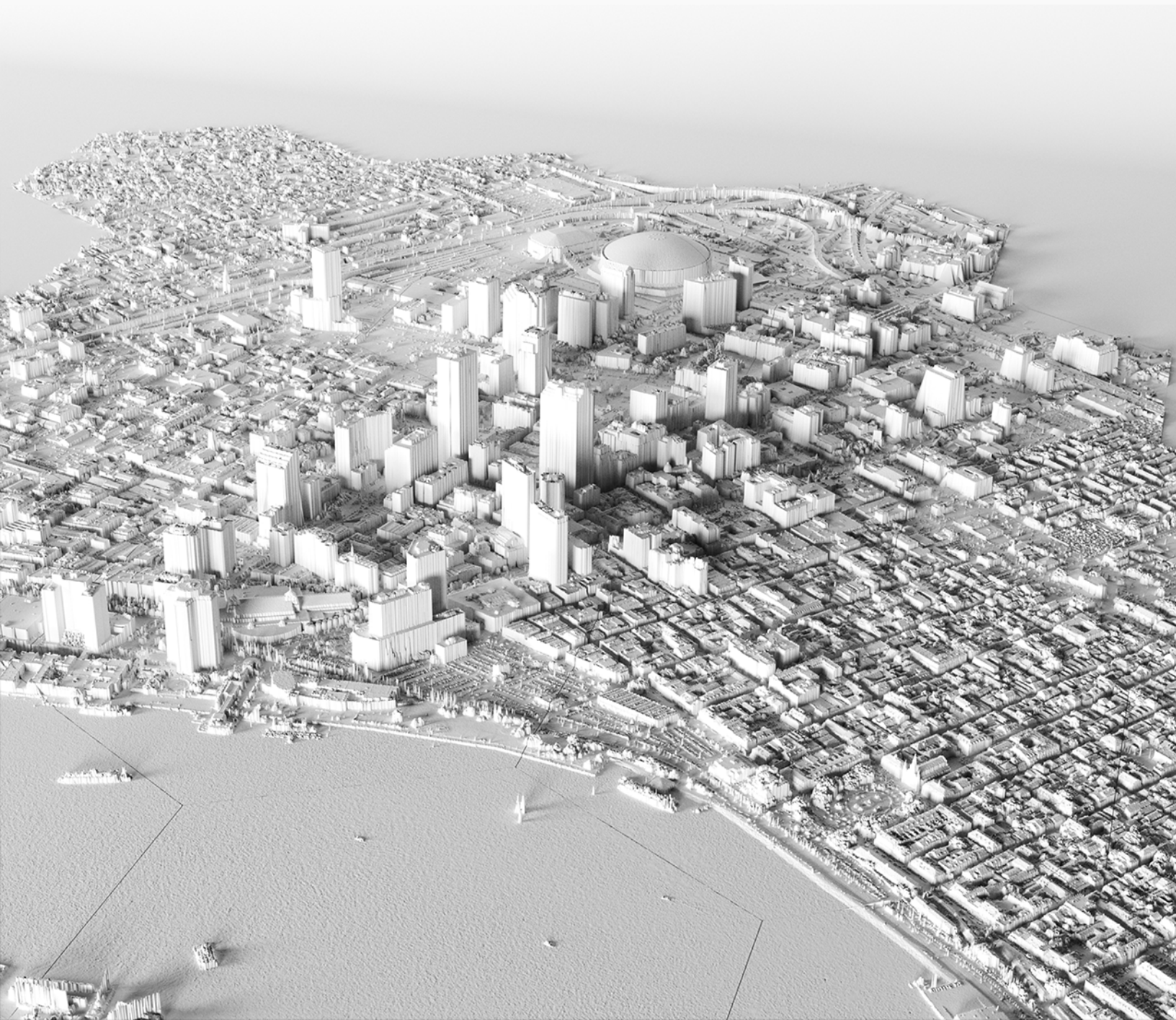Monday, Wednesday, & Friday 9:30am–11:20pm.

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Course Description

This course is an introduction to Geographic Information Systems (GIS) and Science (GISc) for designers. Learn about the history, theory, methods, and applications of GIS. Acquire, map, model, and analyze spatial and temporal data. Make beautiful maps and digitally fabricated models from spatiotemporal data.

Topics

1	Geodesy	6	Map Algebra	11	Lidar
2	Intro to GIS	7	Programming	12	Demographics
3	Global Data	8	Hydrology	13	Ecology
4	Urban Data	9	Visibility & Solar	14	Web Mapping
5	Terrain Analysis	10	Cartography	15	Map Exhibition

Online

This class will be taught online. All course content including tutorials, lectures, and datasets will be published on the course website at: `http://baharmon.github.io/gis-for-designers`. During our regularly scheduled class period on MWF from 9:30-11:20 am, we will meet on our Discord server at `https://discord.gg/qRwCfhJ` for live streamed lectures, discussions, student presentations, and troubleshooting. Before each class please complete the assigned tutorial and homework. Post your tutorial work, homework, and project work on your channel on the Discord server. Each tutorial will have a page on the course website and a video on both Youtube and Vimeo.

Course website | `http://baharmon.github.io/gis-for-designers`
Discord | `https://discord.gg/qRwCfhJ`
Youtube | `https://www.youtube.com/channel/UCmGEF6Bf1SO92oLQoGCPDTw`
Vimeo | `https://vimeo.com/showcase/7356098`

Projects

Map spatial and temporal data at global, city, and site scales. Make beautiful maps that clearly, legibly represent the data, express your message, and follow cartographic conventions. Legends, scale bars, and north arrows are required. Upload your working files and finished work to the course drive. Exhibit your collected work at the end of the semester on *12/04/2020*.

Global maps Create a map of a global pattern or process. Possible topics include landcover change, protected areas, urbanization, biodiversity, hydrology, transportation, etc. Choose your map projection carefully.

City maps Create a map of New York City. Possible topics include the built environment, cultural events, cultural and historic places, socioeconomic conditions, public health, crime, education, hydrology, terrain, levees, flooding, etc.

Portfolio Collect your work in a course portfolio for the school's accreditation archive. *Due: 12/11/2020*

Software

QGIS | https://qgis.org/
GRASS GIS | https://grass.osgeo.org/
ArcGIS | https://www.esri.com/
Rhinoceros | https://www.rhino3d.com/

RhinoTerrain |
http://www.rhinoterrain.com/
Thea Render for Rhino |
https://www.thearender.com/

Datasets

Natural Earth Dataset for GRASS GIS | https://zenodo.org/record/3762852
Governor's Island Dataset for GRASS GIS | https://zenodo.org/record/3940780

Resources

List of geospatial data sources | http://baharmon.github.io/data
Intro to GRASS GIS | https://ncsu-geoforall-lab.github.io/grass-intro-workshop/
Geospatial Modeling Course | https://ncsu-geoforall-lab.github.io/geospatial-modeling-course/
GRASS GIS tutorials | https://grass.osgeo.org/documentation/tutorials/
QGIS training material | https://www.qgis.org/en/site/forusers/trainingmaterial/
ArcGIS training | https://www.esri.com/training/
Learn ArcGIS | https://learn.arcgis.com/

Grading

Global map	22.5%	Tutorials	25%
City map	22.5%	Homework	25%
Portfolio	5%		

Terminology

Geodesy

- Datum
- Geographic coordinate system
- Map projection
- Cartographic grid
- Graticule

Spatial data

- Raster & vector
- Array
- Point & point cloud
- Mesh
- Triangulated irregular network (TIN)
- Discrete & continuous data
- Plain text
- Comma separated values (CSV)
- Integer & floating point numbers

Geospatial

- Geographic information system (GIS)
- Digital terrain model (DTM)
- Digital surface model (DSM)
- Digital elevation model (DEM)
- Depressionless DEM

- Lidar
- Delaunay triangulation
- Bilinear interpolation
- Nearest neighbors
- Map algebra
- Null value
- Resampling
- True color imagery
- Image classification
- Normalized difference vegetation index (NDVI)
- Hypsometric tints
- Contour
- Hillshade
- Slope
- Aspect
- Watershed
- Single flow direction (SFD/D8)
- Multiple flow direction (MFD)
- Flow accumulation
- Stream order

Readings

Correa, Felipe. *São Paulo: A Graphic Biography*. University of Texas Press, 2018.

Petrasova, Anna, Brendan A Harmon, Vaclav Petras, Payam Tabrizian, and Helena Mitasova. *Tangible Modeling with Open Source GIS*. 2nd ed. Springer International Publishing, 2018.

Busquets, J, and P Pérez-Ramos. *Barcelona: Manifold Grids and the Cerdà Plan*. Redesigning Gridded Cities. Applied Research / Design Publishing, 2017.

Cheshire, James, and Oliver Uberti. *Where the Animals Go: Tracking Wildlife with Technology in 50 Maps and Graphics*. W. W. Norton, 2017.

Desimini, Jill, Charles Waldheim, and Mohsen Mostafavi. *Cartographic Grounds: Projecting the Landscape Imaginary*. Princeton Architectural Press, 2016.

San-Miguel-Ayanz, J, D de Rigo, G Caudullo, T H Durrant, A Mauri, European Commission. Joint Research Centre, and Europäische Union. *European Atlas of Forest Tree Species*. Publications Office of the European Union, 2016.

Acciavatti, Anthony. *Ganges Water Machine: Designing New India's Ancient River*. ORO Editions, 2015.

Antoniou, A, R Klanten, S Ehmann, and A A Kotmair. *Mind the Map: Illustrated Maps and Cartography*. Gestalten, 2015.

White, G, M Pienaar, and B Serfontein. *Africa Drawn: One Hundred Cities*. DOM Publishers, 2015.

Cheshire, J, and O Uberti. *London: The Information Capital: 100 Maps and Graphics that Will Change how You View the City*. Penguin Books, Limited, 2014.

Correa, Felipe, and Carlos Garciavelez Alfaro. *Mexico City: Between Geometry and Geography*. Hong Kong: Applied Research / Design Publishing, 2014.

Neteler, Markus, and Helena Mitasova. *Open source GIS: a GRASS GIS approach*. Vol. 689. Springer Science & Business Media, 2013.

Solnit, R, and R Snedeker. *Unfathomable City: A New Orleans Atlas*. University of California Press, 2013.

Steinitz, Carl. *A Framework for Geodesign: Changing Geography by Design*. Redlands, California: Esri Press, 2012.

Forman, Richard T T. *Urban Regions: Ecology and Planning Beyond the City*. Cambridge University Press, 2008.

Steinitz, C, H Arias, S Bassett, M Flaxman, T Goode, T Maddock, D Mouat, R Peiser, and A Shearer. *Alternative Futures for Changing Landscapes: The Upper San Pedro River Basin In Arizona And Sonora*. Island Press, 2003.

Hulse, D, S Gregory, J P Baker, and Pacific Northwest Ecosystem Research Consortium. *Willamette River Basin Planning Atlas: Trajectories of Environmental and Ecological Change*. Oregon State University Press, 2002.

Tufte, Edward R. *Visual Explanations: Images and Quantities, Evidence and Narrative*. Graphics Press, 1997.

McHarg, Ian. *Design with Nature*. Wiley Series in Sustainable Design. Wiley, 1995.

Tufte, Edward R. *The Visual Display of Quantitative Information*. Graphics Press, 1983.

Graduate Certificate in GIS

This course counts as an applied topics course for the Graduate Certificate in Geographic Information Science. The Graduate Certificate in Geographic Information Science at LSU is a 12 credit hour standalone certificate with courses offered in the Department of Geography and Anthropology, College of Art and Design, Department of Economics, School of the Coast and Environment, Department of Civil and Environmental Engineering, and Department of Computer Science. For more information about the Graduate Certificate in GIS visit: `http://ga.lsu.edu/gis-certificate/`.

Communication-Intensive Certification

This is a certified Communication-Intensive (C-I) course which meets all of the requirements set forth by LSU's Communication across the Curriculum program, including instruction and assignments emphasizing informal and formal modes; teaching of discipline-specific communication techniques; use of feedback loops for learning; 40% of the course grade rooted in communication-based work; and practice of ethical and professional work standards. Students interested in pursuing the LSU Communicator Certificate and/or the LSU Distinguished Communicator Medal may use this C-I course for credit. For more information about these student recognition programs, visit `www.cxc.lsu.edu`.

Policies

Accreditation Expectations As an accredited Landscape Architecture program LSU's Robert Reich School of Landscape Architecture (RRSLA) must meet the accreditation requirements as stated by the Landscape Architectural Accreditation Board (LAAB) to ensure RRSLA is meeting the expectations of the field. The LAAB requires programs to provide digital copies of student work as part of this process. Students in this course will be expected to comply with the following requirements as 5% of their course grade: (1) Students must provide a course portfolio with work samples specified by the instructor before the end of the grading period. (2) Each student's course portfolio must be saved as a single, high resolution PDF file with multiple pages. (3) Files must follow the naming convention established by the school: department-coursenumber-semesteryear-username.pdf. Example: LA7075-F2020-baharmon.pdf.

Time Commitment Expectations LSU's general policy states that for each credit hour, you (the student) should plan to spend at least two hours working on course related activities outside of class. Since this course is for three credit hours, you should expect to spend a minimum of six hours outside of class each week working on assignments for this course. For more information see: `http://catalog.lsu.edu/content.php?catoid=12&navoid=822`.

LSU student code of conduct The LSU student code of conduct explains student rights, excused absences, and what is expected of student behavior. Students are expected to understand this code: `http://students.lsu.edu/saa/students/code`.

Disability Code The University is committed to making reasonable efforts to assist individuals with disabilities in their efforts to avail themselves of services and programs offered by the University. To this end, Louisiana State University will provide reasonable accommodations for persons with documented qualifying disabilities. If you have a disability and feel you need accommodations in this course, you must present a letter to me from Disability Services in 115 Johnston Hall, indicating the existence of a disability and the suggested accommodations.

Academic Integrity According to section 10.1 of the LSU Code of Student Conduct, "A student may be charged with Academic Misconduct" for a variety of offenses, including the following: unauthorized copying, collusion, or collaboration; "falsifying" data or citations; "assisting someone in the commission or attempted commission of an offense"; and plagiarism, which is defined in section 10.1.H as a "lack of appropriate citation, or the unacknowledged inclusion of someone else's

words, structure, ideas, or data; failure to identify a source, or the submission of essentially the same work for two assignments without permission of the instructor(s)."

Plagiarism and Citation Method Plagiarism is the "lack of appropriate citation, or the unacknowledged inclusion of someone else's words, structure, ideas, or data; failure to identify a source, or the submission of essentially the same work for two assignments without permission of the instructor(s)" (Sec. 10.1.H of the LSU Code of Student Conduct). As a student at LSU, it is your responsibility to refrain from plagiarizing the academic property of another and to utilize appropriate citation method for all coursework. In this class, it is recommended that you use Chicago Style author-date citations. Ignorance of the citation method is not an excuse for academic misconduct.