LSU | College of Art + Design

LA 7031 | Water Studio

Brendan Harmon
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Fall 2018. Design 217.
Monday, Wednesday, & Friday | 1:30pm–5:30pm.

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Course Description

The Water Systems Studio is an introduction the design and restoration of hydrological systems. This studio will address the derelict gravel mines on the Amite River that have straightened the course of the river, increased erosion and sediment loads, and heightened flooding downriver. In this studio you will learn how to map and analyze hydrological systems, how processes and forms interact, how to design processes as well as forms, and how to design for disturbed landscapes.

Schedule

	Amite Basin		Amite Mines		Generative systems
1	Introduction	6	Inventory	11	Bioengineering
2	Topography	7	Fabrication	12	Generative morphology
3	Diagramming	8	Imagery	13	Spatial catalysts
4	Hydrology	9	Flows	14	Physical simulation
5	Selection	10	History	15	Generative design

Amite Basin	**Project** |	Mapping the Amite
08.20.2018	**Studio** |	Introduction
08.22.2018	**Studio** |	Research
08.24.2018	**Site visit** |	Kayaking the Amite
08.27.2018	**Studio** |	Topographic mapping
08.29.2018	**Review** |	Precedents
08.31.2018	**Lab** |	Mapping the mines
09.05.2018	**Studio** |	Diagramming
09.07.2018	**Lab** |	Digital diagramming
09.10.2018	**Studio** |	Watershed modeling
09.12.2018	**Studio** |	Hydrological mapping
09.15.2018	**Lab** |	Digital painting
09.15.2018	**Workshop** |	Drone photogrammetry
09.17.2018	**Tutorial** |	Suitability
09.19.2018	**Tutorial** |	Cartography
09.21.2018	**Review** |	Map review
Amite Mines	**Project** |	Modeling the Amite
09.24.2018	**Site visit** |	Amite Gravel Mines
09.26.2018	**Studio** |	Inventory analysis
09.28.2018	**Studio** |	Site mapping
10.01.2018	**Lab** |	CNC toolpaths
10.03.2018	**Lab** |	CNC milling
10.08.2018	**Studio** |	Imagery acquisition
10.10.2018	**Studio** |	Imagery interpretation
10.12.2018	**Lab** |	Imagery analysis
10.15.2018	**Studio** |	Water flow
10.17.2018	**Studio** |	Sediment flow
10.19.2018	**Lab** |	Physical simulation
10.22.2018	**Studio** |	Historical mapping
10.24.2018	**Studio** |	Production
10.26.2018	**Review** |	Modeling review
Gen. Systems	**Project** |	Restoring the Amite
10.29.2018	**Site visit** |	LSU Center for River Studies
10.31.2018	**Studio** |	Bioengineering charrette
11.02.2018	**Studio** |	Bioengineering
11.05.2018	**Studio** |	Restoration strategies
11.07.2018	**Studio** |	Landform design
11.09.2018	**Studio** |	Landform construction
11.12.2018	**Studio** |	Process diagramming
11.14.2018	**Studio** |	Evolving landforms
11.16.2018	**Studio** |	Planting design
11.19.2018	**Lab** |	Physical simulation
11.26.2018	**Studio** |	Production
11.28.2018	**Studio** |	Production
11.30.2018	**Studio** |	Production
	Review |	Final review

Projects

Mapping the Amite Research and map the history and impact of mining on the river. Your maps can include text, sectional drawings, 3D visualizations, charts, and diagrams. Represent phenomena in both time and space. Be creative. Based on your research, develop a site selection methodology and pick site for restoration. Present your method and site with a map and logic model diagram. Finally create a digital painting expressing the most important qualities of your research. **Due:** 09.15.2018

Modeling the Amite Inventory, model, and represent the existing conditions on your site in 2D and 3D. Curate and present the data you collect during site visits. Use GIS data and your site inventory to develop a map or series maps that explore and represent your site. Then you will you will model water and sediment flows across your site in GIS. CNC mill a physical model in high density urethane foam of your site from lidar data. Use this model to develop a physical simulation of sediment flow and landscape evolution to intuitively explore how the site may change. **Due:** 10.26.2018

Restoring the Amite Design a plan to restore a degraded, abandoned mining site on the Amite River. Your design should consider and illustrate the process of restoration, the funding for the project, and the phasing of the project. Consider the cost of restoration, the cost of maintenance and management, and sources of income or funding. Consider its future use as for example a recreational park for kayaking, a nature reserve with bird watching, or a sustainable development. As a class develop a masterplan showing the relationship between each of your sites. Individually develop a site plan, other design drawings and diagrams, a conceptual model, and a physical model. **Due:** 11.30.2018

Grading

Mapping the Amite	33%
Modeling the Amite	33%
Generative Water Systems	33%


Gravel mine

Site Visits

Kayaking the Amite We will rent kayaks from University Recreation and kayak along the Amite with a team from Gulf Restoration Network. Check out a Phantom DJI drone and Ricoh Theta 360 degree cameras from the LSU cxC Art+Design Studio. **Date:** 08.24.2018

Precedent studies Prepare a 15 minute presentation on the Sand Motor, the Renaturation of the River Aire, a case study from Prominski and Stokman's book River.Space.Design, or another project of your choice. **Due:** 08.29.2018

Amite Gravel Mines Visit gravel mines and degraded river banks on the Amite River. Document the sites with sketches, photography, photospheres, and imagery and video from drones. Come prepared with sunscreen, sunglasses, insect repellent, and water. Please bring sketchbooks, DSLR cameras, a DJI Phantom drone, and Ricoh Theta 360 degree cameras. **Due:** 09.24.2018

LSU Center for River Studies Tour the LSU Center for River Studies and see a physical simulation of sediment transport on the Lower Mississippi River Physical Model. **Date:** 10.29.2018

Workshop

Drone photogrammetry Conduct a topographic survey with an unmanned aerial system (UAS) at Hilltop Arboretum. After a morning theory session, survey the arboretum grounds with a drone, and then use stereophotogrammetry to generate a digital surface model. **Date:** 09.15.2018

Readings

Petrasova, Anna, Brendan Harmon, Vaclav Petras, Payam Tabrizian, and Helena Mitasova. 2018. *Tangible modeling with open source GIS*. Springer.

Robinson, Alexander. 2018. *Spoils of Dust: Spoils of Dust: Reinventing the Lake That Made Los Angeles*. ORO Editions.

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

Orff, Kate. 2016. *Toward an Urban Ecology*. Monacelli Press.

Acciavatti, Anthony Acciavatti, Aleksandr Bierig, and Duncan Corrigall. 2015. *Ganges Water Machine: Designing New India's Ancient River*. Applied Research + Design Publishing.

Kennen, Kate, and Niall Kirkwood. 2015. *Phyto: Principles and Resources for Site Remediation and Landscape Design*. Taylor & Francis.

Kotmair, Alisa Anh, Antonis Antoniou, Robert Klanten, and Sven Ehmann. 2015. *Mind the Map: Illustrated Maps and Cartography*. Gestalten.

Reed, Chris, and Nina-Marie E. Lister. 2014. *Projective Ecologies*. Harvard University Graduate School of Design.

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

Prominski, Martin, Antje Stokman, and Susanne Zeller. 2012. *River, Space, Design: Planning Strategies, Methods and Projects for Urban Rivers*. Birkhauser.

Spearing, Darwin. 2007. *Roadside Geology of Louisiana*. Roadside Geology Series. Mountain Press Pub.

Reports

Fluvial Instability and Channel Degradation of Amite River
August 2016 Flood Report Amite River Basin
Louisiana Watershed Resiliency Study
Louisiana Watershed Resiliency Study: Amite Watershed
Amite River Sand and Gravel Mine Reclamation Demonstration Project
River Sand and Gravel Mining Data

Handbooks

USDA Stream Restoration
Federal Stream Corridor Restoration Handbook
Stream Restoration: A Natural Channel Design Handbook
USACE Environmental Design Handbook
The Practical Streambank Bioengineering Guide
USDA NRCS Streambank and Shoreline Protection
National Large Wood Manual
FEMA Engineering with Nature

Software

GRASS GIS | `https://grass.osgeo.org/`
ArcGIS | `https://www.esri.com/`
Rhinoceros | `https://www.rhino3d.com/`
RhinoTerrain | `http://www.rhinoterrain.com/`
RhinoCAM | `https://mecsoft.com/rhinocam-software/`

Supplies

Required supplies

- 12” roll of tracing paper
- 24”+ roll of tracing paper
- Alcohol based makers
- Felt tipped pens
- Pencils and erasers
- Masking tape & drafting dots
- Scale bar
- Drafting triangles
- Straight-edge cutting ruler
- Knives & blades

Optional supplies

- 24”+ roll of vellum
- 10-20 lbs Kinetic Sand
- Aluminum or bronze ingots
- Polystyrene foam
- Spray adhesive

College supplies

- High density urethane foam
- Kinetic sand
- Wax
- Propane torches

Terminology

Bioenginnering

- Bioengineering
- Engineering with Nature
- Gabion
- Fascine
- Willow mattress
- Pollard
- Coppice
- Short rotation coppice

Geomorphology

- Braided channel
- Meander
- Oxbow Lake
- Point bar
- Slip-off slope
- Cut bank
- Knickpoint
- RUSLE
- Unit Stream Power
- Mannings
- Spoil
- Pit

Data types

- Vector
- Raster
- Point cloud
- Mesh

Policies

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.