DIGITAL HERITAGE DOCUMENTATION:
GIS, BUILDING SURVEYING AND DATA MANAGEMENT

Spring 2021 | Wednesdays 5-7pm | Columbia University | GSAPP | HP | A 6414
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COURSE DESCRIPTION

Overview

Heritage places are areas of complex data with spatial relations. In order to make pertinent preservation, planning, and management decisions on heritage places, the spatial data regarding these places should be derived, stored, structured, analyzed and presented with a systematic and robust approach. Thus, a well-constructed heritage recording and information management system has a crucial role for the future of the heritage places. **"Digital Heritage Documentation: GIS, Building Surveying and Data Management" course is designed to give information about different techniques and tools in heritage recording and information management in different contexts and cases according to place's scale, accessibility, and required outcome.**

The course consists of two cores. The first core focuses on the digital documentation and information management of heritage places in site and urban scale. Geographic Information System (GIS), which is an essential data management tool to store, process, analyze and present complex spatial data collected from various sources like site surveys, archives, and literature, will be introduced during this part of the course. **The second core focuses on the documentation and information management of heritage places in site, building and feature scales.** In this part, different heritage surveying and recording techniques like photogrammetry 3D laser scanning, and traditional techniques will be introduced.

During the course, the students will have the opportunity to have hands-on experience in the digital heritage documentation processes via lectures, site surveys and lab exercises. In addition to hands-on experiences with various surveying equipment and computer software, students will build and expand their skills in integrated heritage recording, documenting, monitoring, information management, and presentation processes in different scales.

Method of Instruction

The class meets once a week on Wednesdays between 5:00-7:00 pm in virtual classroom. The course is structured with online lectures, hands-on software exercises, and field surveys (due to pandemic, in person attendance to field survey is optional). The lectures will give information about the systematic approaches in heritage documentation as well as the possibilities offered by different techniques in heritage documentation and information management.

During the site surveys, students will have the opportunity to experience building surveying techniques like photogrammetry, 3D laser scanning, and traditional techniques. With hands-on exercises in the virtual class, they will build and expand their skills on information management and heritage documentation with the possibilities offered by different computer software applications like ArcGIS, Faro Scene and Reality Capture.

The class is designed around project-based learning. The classes and assignments are structured to complete these projects during the course of the semester.

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Student Learning Outcomes

The course aims to give each student knowledge about the basics of the digital heritage documentation in different scales and equip students with new theoretical and technical skills to engage in the processes of surveying, recording, information management and presentation of heritage places.

The student, who successfully pass the class:

► will be able to organize and manage an integrated heritage recording, documenting, monitoring, information management, and presentation processes depending on heritage place's requirements

► will be able to work and involve in a heritage documentation processes in different scales and geographies

► will have basic knowledge and experience on GIS (Geographic Information System), which is an essential data management tool to store, process, analyze and present complex spatial data collected from various sources like site surveys, archives, and literature

► will have knowledge and experience on recording and documenting a heritage place with photogrammetry and 3D laser scanner.

► will be able to identify different methods, tools, and techniques in heritage documentation processes

EVALUATION, TENTATIVE COURSE OUTLINE and GRADING

Assignments

You are expected to complete two assignments throughout the course. In addition to these assignments, you will be also assigned to complete weekly tasks.

The assignments are designed as an opportunity for students to visualize and manage the data they are dealing in their studio work or individual research. First-year HP students are encouraged to conduct their projects in accordance with their projects on HP Studio II.

Assignment 01 | GIS Database Design

You are expected to design a GIS database for a heritage site and research a case on heritage surveying, recording and heritage information management on site or urban scale.

You will be conducting the survey and the research in groups of 2 or 3, defined and announced in the second week of the semester. Creating base maps, designing the mental map for the project, collecting raw data about the site, transferring your raw data into GIS and structure it according to your database design, and making analysis and queries over the data will be some of the important milestones of your assignment.

In your final presentation, you are expected to explain the processes you have followed to achieve the milestones in your project and discuss it in comparison with a case study you have researched. In your final submission, you are expected to submit the digital files

(geodatabases, .mxd files etc.) of your project with a report (max. 2 pages, around 700words), which briefly describes of the process you have experienced and discusses the case you have researched. The reports should be cited using Chicago Manual of Style parenthetical author-date system.

Assignment 02 | Architectural Heritage Recording

You are expected to survey, record and document a heritage place and research a case on heritage surveying and recording on site, building or feature scale. You will be conducting the survey and the research in groups of 3 or 4 students, defined and announced at the sixth week of the semester.

Recording the selected heritage site, building or feature with photogrammetry and/or 3D laser scanning, creating digital 3D models and orthoimages of the heritage site, and recording a small portion of the

selected site (a facade or feature) with traditional techniques will be some of the milestones of your assignment.

In your final presentation, you are expected to explain the conveniences and challenges of the techniques that you have experienced in your assignment and discuss the advantages and disadvantages of these techniques in comparison with the techniques used in the case you have researched. In your final submission, you are expected to submit the digital files (photographs, 3D point clouds, and orthoimages) with a report (max. 2 pages, around 700 words), which briefly describes of the process you have experienced and discusses the advantages and disadvantages of different surveying and recording techniques that you have experienced and researched. The reports should be cited using Chicago Manual of Style parenthetical author-date system.

Weekly Tasks:

Weekly tasks are determined to successfully complete the Assignments 01 and 02 while keeping the track. Each task is designed as a milestone for Assignment 01 and 02.

The weekly tasks are connected to each other, as each of them will be the prerequisite for the next one. You will receive feedbacks for Assignments 01 and 02, through these weekly tasks. Thus, completing the weekly tasks in time and having necessary feedbacks before your final presentation and submission is very crucial to successfully complete the Assignments 01 and 02. The weekly tasks will be announced on the canvas each week.

Participation & Attendance

You are expected to attend every class meeting and the site survey, and your attendance will contribute to your final grade. Attendance sheets will be distributed at the beginning of the class. Your participation in the discussions will also be evaluated for your final grade.

Expectation of academic honesty

The class is conducted in accordance with academic honesty. Instances of plagiarism will not be tolerated in the class.

GIS Database Design

WEEK **01** January 13	> Introduction to the course > Introduction to GIS in Historic Preservation > Creating basemaps via georeferencing Weekly Task 01 | to be announced on the Canvas, due Sat, Jan 16, 9am
WEEK **02** January 20	> Database design and data inputs I : Creating and editing vector data and attribute tables > Visualisation of data: Symbology, classifying data, designing map outputs Weekly Task 02 | to be announced on the Canvas, due Sat, Jan 23, 9am
WEEK **03** January 27	> Database design and data inputs II : Joining, cleaning and organizing data > Visualisation of data: Symbology, classifying data, designing map outputs Weekly Task 03 & 04 | to be announced on the Canvas, due Sat, Jan 30, 9am &Tue., Feb 2, 5pm
WEEK **04** February 03	> Data analysis and query : SQL, field calculator and exporting data Weekly Task 05 | to be announced on the Canvas, due Sat, Feb 6, 9am
WEEK **05** February 10	> Dissemination of Data: ArcGIS Online and StoryMaps Weekly Task 06 | to be announced on the Canvas, due Sat, Feb 13, 9am
WEEK **06** February 17	> Presentations Submissions due Sat, Feb 20, 9am

Architectural Heritage Recording

WEEK **07** February 24	> Photogrammetry Weekly Task 07 | to be announced on the Canvas, due Sat, Mar 06, 9am
SPRING BREAK	
WEEK **08** March 10	> 3D Laser Scanning > Measured drawings, mapping of materials and deteriorations Weekly Task 08 | to be announced on the Canvas, due Sat, Mar 13, 9am
March 13, Saturday | Field Survey (Tentative day)	
WEEK **09** March 17	> Processing digital survey data Weekly Task 07 | to be announced on the Canvas, due Saturday, Mar 20, 9am
WEEK **10** March 24	> Digitizing conditions mapping and conditions assessment Weekly Task 07 | to be announced on the Canvas, due Saturday, Mar 27, 9am
WEEK **11** March 31	> Presentations Submissions due Sat, Apr 03 20, 9am
WEEK **12** April 07	> Digital Heritage Documentation and Possibilities of Building Information Modelling (BIM) in Historic Preservation | Guest Lecturer: Bora Sayin, General Manager of Salvotek Engineering

		Deliverables	Deadlines		Grade Points	
Deliverables, Deadlines &Grading						
	Assignment 01 GIS Database Design	Weekly Task 01	Sat.	Jan 16	9am	4	
		Weekly Task 02	Sat.	Jan 23	9am	4	
		Weekly Task 03	Sat.	Jan 30	9am	4	
		Weekly Task 04	Tue.	Feb 02	5pm	4	
		Weekly Task 05	Sat.	Feb 06	9am	4	**49**
		Weekly Task 06	Sat.	Feb 13	9am	4	
		Presentation	Wed.	Feb 17	5-7pm	15	
		Final Submission	Sat.	Feb 20	9am	10	
	Assignment 02 Architectural Heritage Recording	Weekly Task 07	Sat.	Mar 06	9am	4	
		Weekly Task 08	Sat.	Mar 13	9am	4	
		Weekly Task 09	Sat.	Mar 20	9am	4	**41**
		Weekly Task 10	Tue.	Mar 27	9am	4	
		Presentation	Wed.	Mar 31	5-7pm	15	
		Final Submission	Sat.	Apr 03	9am	10	
Participation & Attendance					**10**	
					100	

RESOURCES and MATERIALS

Software & Hardware

For GIS database design and applications, the course will use ESRI's ArcGIS suite of software. For processing point clouds, the course will be using Reality Capture and Faro Scene.

Canvas and Zoom Platforms &Lion Drive

The classes will be conducted via virtual classroom on Zoom platform. The course will heavily rely on the Canvas. If you have any questions, you are encouraged to use the discussion platform on Canvas to reach your peers during "crunch times", when you need an immediate answer and collectively work toward solving the problems. In addition, updates in the tentative course outline and deliverable deadlines, as well as the requirements of the assignments and weekly tasks, will be announced in the canvas and via class-wide e-mails. Thus, you are responsible to check the canvas and your e-mails regularly. The class will use Lion Drive for submitting deliverables. Feedbacks on the deliverables will be given through lion drive as well.

Digital Service Science Center (DSSC)

DSCC, located on the lower level of Lehman Library is a great resource, which is providing support for data management and technical solutions for the GIS software. The facility is equipped with computer stations that are available for your use. You can also consult with a GIS specialist regarding technical GIS operations.

They also have a collection of spatial data, that you can search online through their website. If you cannot find the data you are looking for, librarians can help you to find it. Please visit the website for their   services: https://library.columbia.edu/services/research-data-services.html

Center for Spatial Research	SR, which holds a GIS infrastructure including workshops and classes is another great resource for you. Their page provides information on various GIS software, including ESRI's ArcGIS Suite and offers online tutorials. https://www.arch.columbia.edu/gis
Lynda Platform	You are encouraged to use the Lynda platform via Columbia University's subscription. The platform contains several tutorials regarding various GIS software including ESRI's ArcGIS suite. https://www.lynda.com/GIS-training-tutorials/2065-0.html
ESRI User Platforms	You can use ESRI user forums to find answers for your GIS software questions. It is highly recommended you visited these resources to find instant solutions for your software related problems. https://community.esri.com/ https://desktop.arcgis.com/en/arcmap/
CIPA & RecorDIM	CIPA Heritage Documentation (Comité International de la Photogrammétrie Architecturale/International Committee of Architectural Photogrammetry) is an international organization that applied technology from the measurement, the visualization and the computer sciences for the benefit of recording, conserving and documenting cultural heritage in all its possible forms. RecorDIM (Recording, Documenting and Information Management) is an initiative partnership of ICOMOS (International Council on Monuments and Sites), GCI (The Getty Conservation Institute) and CIPA (International Committee of Architectural Photogrammetry).
	The websites of CIPA and ReCORDIM provides a rich collection of resources regarding the tools and cases in heritage recording, documenting and information management of heritage places. You can find various cases for your research through their websites. http://cipa.icomos.org/ http://extranet.getty.edu/gci/recordim/index.html
Online Resources for Spatial Data	**New York City Data** NYC Open Data Portal: https://opendata.cityofnewyork.us/ Bytes of Big Apple: https://www1.nyc.gov/site/planning/data-maps/open-data.page **New York State Data** https://gis.ny.gov/ **U.S. Data** https://www.data.gov/ https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml https://www.census.gov/geo/maps-data/data/tiger.html https://www.nhgis.org/ https://www.socialexplorer.com/ https://www.usgs.gov/core-science-systems/ngp/tnm-delivery/

Global Data

https://geodata.library.columbia.edu/

http://download.geofabrik.de/

Map Collections

https://library.columbia.edu/locations/maps.html

https://www.loc.gov/maps/collections/

http://www.oldmapsonline.org/

https://www.nypl.org/about/divisions/map-division