

DIGITAL HERITAGE DOCUMENTATION: GIS, BUILDING SURVEYING AND DATA MANAGEMENT

Spring 2023 | Columbia University | GSAPP | HP | A 6414
Wednesdays 5-7pm | 301 Fayerweather or Schermerhorn Hall, Room 655 (Preservation Technology Lab) | Instructor: Bilge Kose | bk2539@columbia.edu | TA: Adam Brodheim | ab4522@columbia.edu

COURSE DESCRIPTION

Overview

Heritage places are areas of complex data with spatial relations. To make proper preservation, planning, and management decisions on heritage places, the spatial data should be derived, stored, structured, analyzed, and presented with a systematic approach. Thus, a well-constructed heritage recording and information management system has a crucial role in the future of 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, in accordance with the place’s scale and accessibility as well as the required outcome of the documentation.**

The course consists of two cores. The first core focuses on the digital documentation and information management of heritage places on site and urban scales. Geographic Information System (GIS), 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 documenting and managing heritage places on the site, building, and feature scales.** In this part, different heritage surveying and recording techniques like photogrammetry, 3D laser scanning, and traditional methods will be introduced.

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

Methods of Instruction

The class meets once a week on Wednesdays between 5:00-7:00pm in Schermerhorn Hall, Room 655 or Preservation Technology Lab, please follow the announcement for the locations. The course is structured with lectures, hands-on software exercises, and a field survey. 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.

**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 three major assignments throughout the course. In addition to these assignments, you will be also assigned to complete weekly assignments.

The assignments are designed as an opportunity for students to critically discuss and analyze the tools and workflows of different digital heritage documentation techniques as well as manage, visualize and disseminate the data they are working on. First-year HP students are encouraged to conduct their projects in accordance with their projects on HP Studio II.

Assignment 1 | GIS Database Design, Creating New Information and Dissemination

You are expected to design a GIS database for a heritage site and disseminate your knowledge it via a StoryMap design at the end of the semester.

Creating base maps, designing the logical map for the project, collecting raw data about the site, transferring your raw data into GIS, structuring it according to your database design, making analysis and queries over the data, transferring data to ArcGIS Online and designing your StoryMap will be some of the important milestones of your assignment. You are going to work as individually or as a group at the different stages of the assignment.

Assignment 2 | Architectural Heritage Recording

You are expected to survey, record and document a heritage place .You will be conducting the survey in groups of 2 or 3 students.

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, material and deteriorations mapping, and researching a project will be some of the milestones of your assignment. You are going to work as individually or as a group in different stages of the assignment.

Assignment 3 | Research Assignment

You are expected to research a case on heritage surveying and recording on site, building or feature scale, in which digital technologies are used for documentation. You are expected to present your findings in comparison with your experiences in this course. You will be conducting the research individually or groups of 2 students.

Weekly Assignments:

Weekly assignments are determined to successfully complete the above mentioned Assignments 1 and 2 while keeping the track of your progress. Each assignment is designed as a milestone for these assignments and each of them will be the prerequisite for the next one. You will receive feedbacks for Assignments 1 and 2, through these weekly assignments. Thus, completing the weekly assignments in time and having necessary feedbacks before your final presentation and submission are very crucial to successfully complete the Assignments 1 and 2. The weekly assignments will be announced on the canvas each week.

Deliverables, Deadlines & Grades

	<i>Deliverables</i>	<i>Deadlines</i>	<i>Points</i>	
Assignment 1 GIS Database Design, Creating New Information and Dissemination	GIS Weekly Assignment 1	Jan 29 Sun 10am	2	45
	GIS Weekly Assignment 2	Feb 5 Sun 10am	2	
	GIS Weekly Assignment 3	Feb 5 Sun 10am	4	
	GIS Weekly Assignment 4	Feb 12 Sun 10am	4	
	GIS Weekly Assignment 5	Feb 19 Sun 10pm	3	
	Mid-Review Presentation	Mar 8 Wed 5 pm	5	
	Final Review Presentation	Apr 19 Wed 5 pm	15	
	Submission	May 5 Fri 11 pm	10	
Assignment 2 Architectural Heritage Documentation	AHR Weekly Assignment 1	Apr 1 Sun 10am	5	40
	AHR Weekly Assignment 2	Apr 8 Sun 10am	5	
	AHR Weekly Assignment 3	Apr 15 Sun 10am	5	
	Final Review Presentation	Apr 19 Wed 4pm	15	
	Submission	May 5 Fri 11 pm	10	
Assignment 3 Research Project	Final Review Presentation	Mar 8 Sun 10am	5	10
	Paper Submission	Mar 22 Wed 11 pm	5	
Attendance &Participation			5	

**Tentative
Course
Outline**

CLASS 01 Jan 25	<ul style="list-style-type: none"> > Introduction to the course > Introduction to GIS in Historic Preservation > Georeferencing historical maps > Disseminating Data I: Sharing project files
CLASS 02 TBD	<ul style="list-style-type: none"> > Data Inputs I : Open data and joining, cleaning, organizing data > Visualisation of Data I: Classifying data and Symbology > Database Design: Logical Map to Digital Map
CLASS 03 Feb 1	<ul style="list-style-type: none"> > Data inputs II : Creating and editing vector data and attribute tables > Dissemination of Data II: Adding metadata > Visualisation of Data II: Designing map outputs
CLASS 04 Feb 8	<ul style="list-style-type: none"> > Data Analysis and query in ArcGIS I : SQL, field calculator and exporting data > Deciding the research topics and groups for Assignment 3
CLASS 05 Feb 15	<ul style="list-style-type: none"> > Data Analysis and query in ArcGIS II: SQL, field calculator and exporting data
CLASS 6 Feb 22	<ul style="list-style-type: none"> > ArcGIS online and Story Maps I > Feedbacks and discussion on research topics for Assignment 3
CLASS 07 Mar 1	<ul style="list-style-type: none"> > ArcGIS online and Story Maps II
CLASS 08 Mar 8	<ul style="list-style-type: none"> > Mid Review of GIS Assignment (Assignment 1): Communicating via StoryMaps and Submission of Final Maps > Final Presentations of Research Assignment (Assignment 3)
SPRING BREAK	
WEEK 09 Mar 22	<ul style="list-style-type: none"> > Architectural Heritage Recording Part I: Introduction to Photogrammetry, 3D Laser Scanners and Traditional Techniques > Introduction to Conditions Documentation: Material and Deterioration Mapping
Mar 25, Saturday Field Survey	
WEEK 10 Mar 29	<ul style="list-style-type: none"> > Architectural Heritage Recording Part II: Processing Data with Photogrammetry, Guest Lecturer Banu Sayin, Co-founder of Salvotek International
WEEK 11 April 5	<ul style="list-style-type: none"> > Architectural Heritage Recording Part III: Combining Laser Scan with photo 3D data, Guest Lecturer Bora Sayin, Co-founder of Salvotek International
WEEK 12 Apr 12	<ul style="list-style-type: none"> > Digitizing conditions documentation > Q&A and feedbacks
WEEK 13 Apr 19	<ul style="list-style-type: none"> > Final Review Architectural Heritage Documentation (Assignment 1) > Final Review GIS Assignment: Communicating via StoryMaps (Assignment 2)
Week 14 Apr 26	<ul style="list-style-type: none"> > Discussion, Q&A and final feedbacks before final submission

***Participation
and
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.

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. The softwares are only working with PCs.

***Canvas and
Zoom
Platforms &
Lion Drive***

The classes will be conducted via virtual classroom on Zoom platform in the first two weeks of the semester. 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 or Canvas as well.

***Digital
Service
Science
Center
(DSSC)***

DSSC, 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>

***LinkedIn
Learning
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 and 3D modelling programs including Faro Scene and Reality Capture.

**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 &
RecoDIM**

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. RecoDIM (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>

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>

IPUMS: <https://www.nhgis.org/>

New York State Data

NYS Open Data: <https://gis.ny.gov/>

U.S. Data

U.S. Government Open Data: <https://www.data.gov/>

U.S. Census Bureau Data: <https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>

National Historical GIS: <https://www.nhgis.org/>

Social Explorer: <https://www.socialexplorer.com/>

U.S. Geological Survey: <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>