

HSPV5550-001 INTRODUCTION TO ARCHITECTURAL CONSERVATION: PERFORMANCE,
DURABILITY, AND WEATHERING OF TRADITIONAL BUILDING MATERIALS

Prof. Frank G. Matero / Tues 1:45-4:45/MEYR B7

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<https://calendly.com/fgmatero>

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William Hogarth, *Finis or, the Tail Piece.— The Bathos, &c.*

*The gorgeous palaces, the solemn temples, Yea even the grate globe
itself, And all that it inhabit shall dissolve, And like the baseless fabric of
a vision, Leave not a wreck behind.*

William Shakespeare. *The Tempest*. Act 4, Scene 1

1.0 Description

1.1 *Architectural Conservation* is the science of preserving the physical fabric of the built environment: examining, recording, and analyzing the materials, construction, evolution and deterioration of structures; conducting investigations to diagnose and determine the cause and effect of material and systemic pathologies; and designing and executing interventions focused on maintaining the integrity of the historic fabric. It is the technical means by which the whole spectrum of preservation interventions is accomplished on a broad range of immovable cultural property:

buildings, structures, monuments, landscapes and archaeological sites. As one specialization within the broader field of Historic Preservation, it is distinguished by the application of *scientific method* in the study of historic buildings and sites in accordance with a clearly defined theoretical and methodological approach. This implies an established system of principles, practices, and procedures developed specifically for the examination, analysis, and treatment of historic and cultural resources. Such an approach depends on inter-disciplinary cooperation that must precede any conservation intervention and includes historical research, archaeological investigation, survey and documentation, materials analysis, testing and evaluation, and craft.

1.2 HSPV 555/Introduction to Architectural Conservation Science is an introduction to the technical study of traditional building materials. The course focuses on the properties, durability, and especially weathering of these materials and the basic laboratory-based methods that can be employed for their study and characterization. Lectures and coordinated laboratory sessions introduce the nature, structure, composition, and deterioration mechanisms of a wide array of building materials including earth, stone, brick, terra cotta, concrete, mortars and plasters, metals, wood, and paints. The course provides a basic knowledge of the major building materials in use before the Second World War in industrialized as well as pre-industrial traditional contexts. (For those interested in Modernism and its material expressions-see HSPV 741/Topics in Conservation: Modern Matters. HSPV 555 and HSPVxxx Building Pathology form the introductory elective core for the concentration in Architectural Conservation in the first year. Advanced material seminars complete the sequence in the second year.

2.0 Structure

2.1 The course will commence each week with a 1.5 hour lecture followed by lab-based sessions where participants will gain first-hand experience with the material properties and standard tests used to determine those properties. Microscopy will be introduced as an examination tool early in the semester to allow students to make visual connections between a material's composition and microstructure and its physico-chemical properties.

3.0 Requirements

3.1 Attendance: Enrolled (non-audit) students are required to attend the lectures and laboratory sessions. Official audits will be expected only to attend lectures and may participate in the laboratory sessions pending available space. Of course, I understand that sometimes emergencies or other unexpected circumstances arise that make attendance that day impossible. If this is the case, please talk with me as soon as

possible so we can make arrangements to get you caught up. If you will be absent from a class for a university-sponsored activity, please make arrangements with me beforehand regarding any work you might miss.

- 3.2 Weekly Quizzo: To test your understanding of key concepts related to the readings each week, one question will be posted to be answered by each group and scored by the class. The winning team will get a fabulous prize and bragging rights.
- 3.3 Lab Reports: The lab write ups constitute a large part of this course. In addition to helping you directly observe many of the concepts in the readings and lectures, the labs will introduce you to scientific method, technical writing, and professional testing standards. Draft lab reports are to be submitted by each team generally no later than one week after the lab session to me and the Lab Manager. All labs will be returned with comments for revision. Labs requiring more than one week for completion are noted in the class schedule (see 6.0). **All final labs are due no later than 12/18 at 12:00 noon in the HSPV Office. Lab reports are to be submitted in PDF and printed formats.**
- 3.4 Readings: Required readings for each week will be placed in the Readings folder (See 5.0 below). Optional material will also be posted each week for your viewing pleasure but is not required reading. Readings may be done BEFORE or AFTER the class session; do whatever works best for you. The lectures, readings, and labs are all coordinated to maximize your understanding of the weekly topic.
- 3.5 Grades: If you have enrolled in HSPV555 I assume you will do the work to the best of your ability. There will be two grades only: A for all work completed and submitted on time and participation in weekly Quizzo, and C/F for work not completed and submitted on time. Class and lab absences, and non-participation in group Quizzo will render the above null and void, possibly resulting in a reduced grade.

4.0 Course Standards

4.1 Academic Integrity

Academic honesty is fundamental to our scholarly community. The *Penn Student Handbook* (<https://www.design.upenn.edu/student-handbooks>) contains the University Code of Academic Integrity, to which the School of Design strictly adheres. A confirmed violation of that Code in this course will result in a failing grade, and likely in other disciplinary measures. The UPenn Code of Academic Integrity is available online at:

<https://catalog.upenn.edu/pennbook/code-of-academic-integrity/>

4.2 Students with disabilities

The University of Pennsylvania provides reasonable accommodations to students with disabilities who have self-identified and been approved by the office of Student Disabilities Services (SDS). Please make an appointment to meet with me as soon as possible in order to discuss your accommodations and your needs. If you have not yet contacted SDS, and would like to request accommodations or have questions, you can make an appointment by calling SDS 215.573.9235. The office is located in the Weingarten Learning Resources Center/Stouffer Commons 3702 Spruce St- Suite 300.

4.3 #AskMe

In order to insure a positive, open and respectful learning environment, I invite you all to email me as to how you identify: preferred name to use in class, preferred pronouns, anything that will allow you and me to create the best classroom environment possible to learn and enjoy the material.

4.4 Laptops/tablets/mobile phones

It is understood that laptop computers will be used only for taking lecture notes or for activities directly related to in-class exercises, not for homework or non-academic purposes. Rogue activities are distracting, disruptive, and disrespectful to our collective objectives to learn through classroom participation. In-class computer use is a privilege that may be suspended at the instructor's discretion if the above guidelines are violated. Laptops are discouraged during lab sessions; however allowed. Rather, you are requested to keep a **lab notebook** to record all work. Cell phone use is prohibited during class except during break time. All mobile phones are to be turned off and placed out of sight during class and lab.

5.0 Course Materials

5.1 Course Folder

The course folder will be organized by: *Course Handouts* (syllabus, info memos, class notes, etc.), *Readings* (bibliography, digital readings), *Labs* (Weekly labs and supplemental materials) and *References* (web sites, manuals, etc.) General Reference materials may also be found on Juno/public/hspv/acl.

5.2 Readings

Readings for each week will be posted on the course folder as a bibliography and will be available either digitally or if a book, on permanent reserve in the Fisher Fine Arts Library under the course name HSPV 555. The TA will also place info memos and other documents on the course folder to assist you in class and lab. These will be placed either in the individual weekly Readings or Lab folders or (if general) in References.

5.3 Labs

Labs and lab supplemental information will be placed on the course folder (under *Labs*) weekly. **All students are expected to bring print outs of the labs only to the lab sessions each week. Copies will not be provided.** TA-assisted lab hours will be scheduled as per class/TA availability. All students will be required to follow university health and safety protocols. Lab coats and safety glasses will be required for all lab work. Lab exercises are to be recorded by each individual team member in a personal lab notebook that will be submitted at the end along with the formal lab write-ups. For lab report writing see: <http://writingcenter.unc.edu/handouts/scientific-reports/>

6.0 Class Schedule

08/30	Lecture: Introduction to Architectural Conservation and the 'Material Turn' Lab orientation & lab safety-Office of Environmental Health and Radiation Safety (EHRS)-4:00pm.
09/06	Lecture: Porous building materials Lab: 01-Characterization of granular samples by sieve analysis 02-Porosity of granular beds
09/13	Workshop: Intro to microscopy and photomicrography-Jose Hernandez
09/20	Lab: 03-Porosity of solids 04-Water vapor transmission (2 weeks)
09/27	Lecture: Earthen materials Lab: 05-Particle size analysis I 06-Plastic and liquid limit
10/04	Lab: 07-Particle size analysis-II
10/11	Lecture: Stone I- Mineralogy-Marie Claude Boileau Lab: 08-Thin section petrography of common building stones
10/18	Lecture: Stone II-Petrology-Marie Claude Boileau Lab 09- Identification of stone hand specimens
10/25	Lecture: Mortars and plasters I Lab: 10-Gravimetric mortar analysis

- 11/01 Lecture: Mortars and plasters II
 Lab: 11-Properties of masonry mortars (2 weeks)
- 11/08 Lecture: Architectural ceramics: brick and terra cotta
 Lab: 12- Capillarity/RILEM Induction tube
- 11/15 Lecture: Concrete – Irene Matteini
 Lab: 13-TBD
- 11/22 Lecture: Architectural metals
 Lab: 14-Identifying architectural metals-microchemical spot tests
- 11/29 Lecture: Architectural wood - Joseph Loferski, Virginia Institute of Technology
 Lab: 15-Wood identification-properties
- 12/06 Lecture: Paints and related surface finishes
 Lab: 16- Opacity (hiding power)
 Lab: 17- Pigment manufacture

7.0 Bibliography: General texts for reference

- Beveridge, W. I. B. *The Art of Scientific Investigation*. New York: Vintage Books, 3rd ed., 1957 (1st ed., 1950).
- Cotterill, Rodney. *The Cambridge Guide to the Material World*. Cambridge, New York, etc.: Cambridge University Press, 1985.
- Cowan, Henry J. *An Historical Outline of Architectural Science*. 2nd ed. London: Applied Science Pub., 1977.
- Dean, Yvonne. *Mitchell's Materials Technology*. Essex: Addison Wesley Longman, 1996.
- Elliott, Cecil D. *Technics and Architecture*. Cambridge, MA and London: MIT Press, 1992.
- Everett, Alan. *Mitchell's Materials*. Essex: Addison Wesley Longman, 1994.
- Moavenzadeh, Fred, ed. *Concise Encyclopedia of Building and Construction Materials*. Cambridge, MA: The MIT Press, 1990.
- Science for Conservators. Vol. 1, An Introduction to Materials*. London: Conservation Unit, 1987. Originally published by Crafts Council, 1982.
- Shugar, Gershon J. et. al. *Chemical Technicians' Ready Reference Handbook*. 2nd ed. Chapters 1-6, 19, 20, 24. New York, etc.: McGraw-Hill Book Co., 1981.
- Taylor, G. D. *Materials of Construction*. London and New York: Longman, 1975.
- Weaver, Martin and Frank G. Matero. *Conserving Buildings: Guide to Techniques and Materials*. New York: Wiley, 1993.