

ARCH A4124**Avery 115 (Wednesday) and 114 (Friday)**

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Fall 2014**Structures Systems & Materials****Wednesdays & Fridays 9:00-11:00 AM***Description*

This course surveys historic architectural materials and building systems and structures. The first part focuses on traditional building materials such as stone, brick, terra cotta, metal, concrete, cast stone, mortar, and wood) and explores sourcing and production of the materials, identification, use in the fabrication of architectural elements, basic properties that limit or allow their use and performance as architectural materials. This part of the course also serves as the foundation for most of the subsequent material-based conservation courses such as: 1. Architectural Metals, 2. Concrete, Cast Stone and Mortar, 3. Brick, Terra Cotta and Stone, and 4. Wood.

The second part of the semester surveys historic structures and systems and approaches the building not from its constituent materials and their properties but as an assembly of particular materials and building elements. It studies the design, detailing and material together to understand how materials interact and assess their collective performance. The question will not be the condition of the individual material but are the design, detailing and material the right solution for the visual and technical performance required. The latter will take into account also such issues as environmental, public health and fireproofing considerations, which played an important role throughout the 19th and 20th centuries.

This part of the course is itself is divided into sections. The first is dedicated to an examination of more traditional building technologies and focuses on primarily load bearing wall systems. The second part will examine fundamental changes that occur in the building trades as a result of the Industrial Revolution. It deals with more developed building technologies as they began to emerge by the middle or the end of the 19th century with steel or concrete structural framing systems and their exterior cladding of masonry, glass and metal curtain wall systems or concrete and stone panels.

At all times not only will the historic technology be presented but also how it performs and what types of failures may be anticipated will be integral to the part of the discussions.

Readings and Assignments

Readings are posted to the *Shared Files* folder in *CourseWorks*. Students should be prepared to answer questions on the readings during class.

Grades

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| Attendance & class participation | 20% |
| Assignments | 30% |
| Examinations | 50% |

Schedule

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| 3 September | Introduction to Course and Field Trip | Faculty Team |
| 5 September | Stone: extraction, production and historical use | Wheeler |
| 10 September | Stone: properties and identification and Field Trip | Wheeler |

Assignment 1, due 17 September

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| 12 September | Brick and Terra Cotta: raw materials and production | Weiss |
| 17 September | Brick: properties, historical use, classification, bond | Weiss |
| 19 September | Terra Cotta: properties and historical use and Field Trip Assignment 2, Due 26 September | Weiss/Allen |
| 24 September | Lime, Gypsum and Cement: raw materials and production | Weiss |
| 26 September | Concrete, Mortar and Plaster: production and historical use | Weiss |
| 1 October | Concrete and Cast Stone: properties & performance & Field Trip Assignment 3, Due 8 October | Weiss |
| 3 October | Metals: raw materials, production, identification | Pieper |
| 8 October | Metals: properties, performance & historical use & Field Trip Assignment 4, Due 15 October | Pieper |
| 10 October | Wood: extraction, production and historical use | Childs |
| 15 October | Wood: properties performance and identification Assignment 5, Due 22 October | Childs |
| 17 October | IN CLASS MIDTERM EXAMINATION | |
| 22 October | Foundations: introduction to early foundation technologies and their use | |
| 24 October | Wall Systems: evolution of wall and partition systems in the 19 th and early 20 th centuries | |
| 29 October | Floor Structures and Systems: the evolution of flooring systems taking into account such issues as span, fireproofing and sound transmission as early considerations | |
| 31 October | Windows and Doors: openings, windows and doors are essential parts of wall. Admitting light and air, their configuration, size and operation underwent considerable changes through the last two centuries | |
| 5 November | Wood Framing and Cladding | |
| 7 November | Roofing and Roofing Structures: with the increase in building size | |

and span the development of new structural systems and spanning methodologies because necessary. A gradual understanding of engineering requirements and the introduction of new materials new forms and techniques developed.

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| 12 November | Introduction to High Rise Framing Technology: with the arrival of the industrial revolution and the demand for different and larger structures, building technology and building construction processes underwent significant changes |
| 14 November | Steel and Concrete: steel and concrete technologies were important factors in the evolution of buildings in both height and span |
| 19 November | Steel and Concrete: continuation of steel and concrete framing discussion |
| 21 November | Masonry Cladding - Brick and Terra Cotta: with the increase in technology for high framing also came the need to find different technologies. After an initial transfer of loadbearing technologies, new systems developed. |
| 27 November | NO CLASS: Thanksgiving Vacation |
| 3 December | Masonry Cladding – Stone, Cast Stone and Pre-Cast: aside from using traditional material technologies, new cladding systems developed using traditional materials |
| 5 December | Curtain Wall – Metal and Glass |
| 12 December | IN CLASS FINAL EXAMINATION |