ATCS 6330-41/42 TECHNOLOGICAL SYSTEMS SEMINAR
Tectonics of Anisotropic Material Properties

Roman Masonry Structure
Photo: © Tsubaki

Course Information:
Name: Technological Systems Seminar
Number: ATCS6330-41/42
Description: An elective course concerned with the advanced study of technical building issues. Concrete, wood, stone, brick - anisotropic materials studied as an experimental masonry structure systems.
Prerequisite: N/A
Credits: (3) semester credit hours
Meeting Place: Pantheon Institute Seminar Room / Rome
Meeting Time: R 9AM -12 PM

Instructor Information:
Name: Kentaro Tsubaki, RA., Assistant Professor
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Office Hours:
TR Noon - 1:00PM (other times by appointment only)
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Course Website:
http://www.ktstudiokt.net/KT_Studio_KT/+Courses.html

Course Introduction:

“So Einstein was wrong when he said, "God does not play dice." Consideration of black holes suggests, not only that God does play dice, but that he sometimes confuses us by throwing them where they can't be seen.”

Nature of Space and Time
Stephen Hawking and Roger Penrose, p. 26

anisotropic |anˌīsəˈtrōpik, -ˈträpik|
adjective Physics
(of an object or substance) having a physical property that has a different value when measured in different directions. A simple example is wood, which is stronger along the grain than across it.

Steel and glass; the two isotropic materials dominated the building construction of the post WWII era and defined the tectonics of modern architecture. This is a no coincidence as "isotropic-ness" lends itself to the quantifiable and predictable material behavior, minimizing the risk inherent in the design and construction of an architectural scale object.

However, none of the predominant construction materials prior to the modern era were isotropic. Wood, masonry, concrete all possess anisotropic (orthotropic) property.

Tectonic characteristics of the earlier buildings rose out of and developed through the necessity to compensate and in some cases, take advantage of these less predictable material behavior.

This seminar focuses on the tectonic characteristics of the building and their historical development through the lens of anisotropic material properties. Our research goal is to gain insight into how the visual intention and the material execution are reconciled through the design and construction process, informing the tectonics of the building as a whole. We will also speculate on how the recent technological development in digital fabrication and scripting can influence the tectonic potential of these materials. Rich architectural heritage of Rome is a perfect backdrop and an ideal resource for such endeavor.

General Methods:
ATCS6330 is a technological systems seminar which requires a substantial dedication and investment of individual student’s time, critical thinking and research skills both during and after official class hours. Typically, 1/2 of the class time will be dedicated for a discussion of assigned reading materials and 1/2 for a design assignment critiques.

Contact time is 160 minutes per week. The expected time spent outside of the class is an average of 3 times the contact time, approximately 8 hours per week. Experience has shown that students who are good at managing time and working in a corroborative environment have a greater degree of success in the course and in the field of architecture in general. It is absolutely an essential component in the architectural practice due to the sheer scale and complexity of designing and constructing buildings that meet the demands of today's increasingly technological society.

Expected Learning Outcomes:

Student will be able to:

- *identify and understand the material properties of anisotropic materials.*
- *identify and understand the structural implication masonry system.*
- *identify basic loads affecting the masonry system.*
- *analyze and apply the visual and spatial implication masonry system*

These outcomes will be demonstrated through representational drawings and models of a semester project.

Featured NAAB Student Performance Criteria (2009) for this course:

B. 9. Structural Systems: Understanding of the basic principles of structural behavior in withstanding gravity and lateral forces and the evolution, range, and appropriate application of contemporary structural systems.

B. 12. Building Materials and Assemblies: Understanding of the basic principles utilized in the appropriate selection of construction materials, products, components, and assemblies, based on their inherent characteristics and performance, including their environmental impact and reuse.

Computer:

Students are required to provide and maintain their own laptop computers for use during the class. See the college website for minimum specifications. Technical difficulties, viruses, crashes, server and print bureau problems, or corrupted files will not be accepted as legitimate excuses. **ALL WORK SHOULD BE CONTINUOUSLY SAVED AND REGULARLY BACKED UP.**

Software:

3D modeling software: AutoCad, Rhino

2D graphics software: Adobe Creative Suite (Photoshop, Illustrator, Acrobat, etc.)

Digital Portfolio:

Digital files (images, drawings, photographs of physical constructs and presentations as well as computer models) will be submitted according to specified formats at designated times throughout the semester. Files will be uploaded to course folder; ftp.arch.tulane.edu

Textbook Requirements:

N/A

Environmental Responsibility:

Aerosol paints, spray glues or fixatives, etc. must not be used inside the building. Violators will **FAIL** the course.

Attendance Policy:

Students are responsible for attending class. All absences must be reported to the course instructor; the only excused absences are those for reasons of health or crisis, and must be justified with written documentation. Unexcused absences could reduce a student's course grade, as will

late arrivals or early departures from class. Three consecutive absences or four nonconsecutive absences will, in normal circumstances, mean that the instructor may give a WF grade to the student. For further details, refer to the academic policies on Tulane School of Architecture website at: http://architecture.tulane.edu/students/academic-policies

Academic Integrity

Tulane University values student self-governance and the development of a strong ethical foundation. The Honor Code is a central element of the University's identity. All academic work must be the result of the student's own efforts, except when collaboration has been explicitly allowed. Any student behavior that has the effect of interfering with education, pursuit of knowledge, or fair evaluation of a student's performance is considered a violation and will be prosecuted through the procedure outlined in the Honor Code. For further details, refer to the Honor Code on the Tulane University website at: http://www.tulane.edu/~jruscher/dept/Honor.Code.html

Civility in the Classroom:

All individuals and/or groups of the Tulane University community are expected to speak and act with scrupulous respect for the human dignity of others, both within the classroom and outside it, in social and recreational as well as academic activities. By accepting admission to Tulane University, a student accepts its regulations and acknowledges the right of the University to take disciplinary action, including suspension or expulsion, for conduct judged unsatisfactory or disruptive. For further information, refer to the code of student conduct on Tulane University website at: http://studentconduct.tulane.edu/

ADA Statement:

It is the policy and practice of Tulane University to comply with the Americans with Disabilities Act (Pub. L. No. 101-336), Section 504 of the Rehabilitation Act of 1973 (Pub. L. No. 93-112, § 504, as amended), and state and local requirements regarding individuals with disabilities. Students who seek accommodation are responsible for registering their disabilities with the Office of Disability Services (ODS) at the Center for Educational Resources and Counseling, requesting the specific accommodations they may need and providing adequate documentation that substantiates their disabilities and shows the need for the requested accommodations. For further details, refer to the Overview of Accommodations Procedures for Students with Disabilities on the Tulane University website at:

http://www.tulane.edu/~erc/disability/AccOverview.htm

Grading/Evaluation:
Evaluation of student performance in ACTS6330-41/42 will be an aggregate of following components weighed accordingly:

Attendance: (20%)
Class discussion participation: (20%)
Weekly Project: (40%=10%x4)
Final Project Documentation: (20%)

All requirements and deadlines must be met in a timely manner. There will be no extension to due date. Late or incomplete work will result in a substantial reduction of the semester grade defined as follows:

A (excellent) exceptional performance; exceeding the requirements of the course, showing strong academic initiative and independent resourcefulness.

B (good) performance above the norm; accurate and complete; beyond the minimum requirements of the course; work demonstrates marked progress and initiative.

C (average) satisfactory work that adequately meets minimum requirements and demonstrates satisfactory comprehension, communication skills, and effort; demonstrates little initiative to investigate the problem without substantial prodding of the instructor; work shows little improvement.

D (inferior) unsatisfactorily meets minimum requirements; demonstrates minimum comprehension, communication skills, and effort at an inferior level; initiative lacking; improvement not noticeable.

F (failing) does not meet minimum requirements; fails to adequately demonstrate comprehension, communication skills, and effort.

ATCS6330-41/42 Course Calendar (subject to change/adjustment)

Meeting	Date	Agenda	Projects	TSA Events
Week 1				
	8/29			Classes begin
		No Class		
Week 2				
1	9/8	Introduction / Discussion 1	Eccentric Masonry Units Ex. 1	
Week 3				
2	9/15	Discussion 2 / Project Critique 1	Eccentric Masonry Units Ex. 2	
Week 4				
3	9/22	Discussion 3 / Project Critique 2	Eccentric Masonry Units Ex. 3	
Week 5				
4	9/29	Discussion 4 / Project Critique 3	Eccentric Masonry Units Ex. 4	
Week 6				
5	10/6	Final Discussion / Final Project Critique	Eccentric Masonry Units Ex. 5	
Week 7				
	10/13	No Class		Vienna Trip
Week 8				
	10/19	No Class		Fall Break
Week 9				
	10/24	No Class		Class Resume
Week 10				
	10/30	Project Documentation Due		