

MATERIAL SYNTAX

UNIVERSITY OF WATERLOO | SCHOOL OF ARCHITECTURE
Arch 684_001 | Fall 2018

David Correa <david.correa@uwaterloo.ca>

Office: 3017 | (by appointment)

Lecture Times, Building and Room Number: Wednesday 6:30-9:30 PM
(ARC 2008)

"Through most of history, matter has been a concern of metaphysics more than physics, and materials of neither. Classical physics at its best turned matter into mass, while chemistry discovered the atom and lost interest in properties . . . [In both metaphysical speculation and scientific research] sensitivity to the wonderful diversity of real materials was lost, at first because philosophical thought despised the senses, later because . . . the new science could only deal with one thing at a time. It was atomistic, or at least, simplistic, in its very essence." Cyril Stanley Smith. *Matter Versus Materials: A Historical View*. In *A Search for Structure*. (MIT Press, 1992). p. 115

Robotic Fabrication LAB at HKU,
Ceramic Information Pavilion (Top).

Chi She Art Gallery in Shanghai by Archi-Union
Architects (Bottom).

Course Description:

This course will explore design at multiple scales. Building from the micro-structure of material, the process of materialization to the functioning form, this course will challenge students to design an experimental façade building component at full scale. Conceived of as a hands-on concise design project of a façade element (3DP masonry component), the course will look at Making as an emergent and non-linear design process through direct engagement with additive material processes.

Operating as a small experimental micro-studio, the course will consist of introductory/foundational lectures followed by weekly design crits and hands-on experimentation with digital clay 3D printing. This course has been developed as part of a research collaboration with MasonryWorx into innovative masonry components.

Interest in materials to inspire curiosity and a strong interest in challenging design boundaries are assets for this course.

*"In biology material is expensive
but shape is cheap.*

*As of today, the opposite was true
in the case of technology."*

Julian Vincent

Learning Objectives:

The course will provide opportunities to

1. Reconsider the role of fabrication and material research as an integral part of the creative process of design.
2. Investigate the role of design in the development of performance-oriented materials
3. Introduce students to tools used to manufacture and prototype products and architecture components
4. Apply design rules for material selection, design for manufacturability, design for assembly
5. Recognize issues of product safety, risk, and reliability

Class Structure:

Each class consists of:

- Lecture
- Student presentation or desk reviews – project progress
- Class discussion

Course Schedule:

			Lecture	Class Discussion
EXPLORE: MAT.CAPACITY	W1	09.12	Intro Lecture Clay Workshop - P1 issued	Intro- Material Capacities Aim
	W2	09.19	Lecture P 2 – issued - D. Proposal	Informed Materials & Additive Manufacturing State of the Art Scope & Context
	W3	09.26	Jessica Steinhauser – SITE VISIT	Methods
DEVELOP: SYSTEM DESIGN	W4	10.3	Lecture Clay Workshop P1 – glazing	Material Informed - Smart Building Components
	W5	10.12	NO CLASS	Team Desk Crits by appointment
	W6	10.17	NO CLASS	Team Desk Crits by appointment
	W7	10.24	P2 A – Review deadline - Prototype Guest Lecturer – Jason Crow	Context
	W8	10.31	Desk Crits	
PRODUCE AND OPTIMIZE	W9	11.07	Desk Crits	
	W10	11.14	P2 B - Review	Smart and Designed Materials
	W11	11.21	Desk Crits	Presenting Research / Research Narrative
	W12	11.28	P2 - Final Project full submission deadline - Exhibition	
	W13	12.03	End of Lectures / Classes	

Attendance:

Attendance to all Lectures and Tutorials is required. Students are expected to arrive shortly before 6:30pm.

Course Evaluation

Project 1	5%
Project 2A	20%
Project 2B	60%
Participation	15%
Total	100%

Laptop and Software equipment:

Laptops should be ready for in class exercises. Students are required to have equipment and software tools ready (installed with appropriate license privileges) prior to class.

Digital Submissions:

Students must make and maintain regular backups of their digital files and documentation material. Lost or corrupt files will not be accepted as an excuse for late project submissions. Digital Submissions will be required for all assignments, as individual students or groups, throughout the term. All files must be submitted in readable pdf and mp4 formats to LEARN.

Credits:

Credit all sources for your work. Identify original authors of all visual documents. Footnote text sources. Include full captions for illustrations. Provide a detailed list of credits with each assignment.

Evaluation:

Each assignment throughout the term will be assessed on the following basis:

- Successful implementation of technical goals as well as meaningful design/architectural insight
- Ambition, clarity and appropriateness of the ideas addressed within the work
- Precision and craft of work developed
- The capacity of the submission to communicate the project's intention in the author's absence.

Deadlines and extension for ARCH 684_002 are only possible in cases of illness or incapacity. Requests for such extensions must be made before the project deadline, as soon as is possible, using the request for extension form available from the Undergraduate Student Services Coordinator – Colleen Richter, accompanied by a medical certificate when necessary, and submitted to the ARCH 684_002 instructor. Students must complete all assignments, and obtain a passing average in order to receive credit for this course. All assigned parts of the work must be completed. Punctual completion is required. Grade penalties will be applied to late submissions and chronic lateness may result in disciplinary review including refusal of acceptance. Late submissions must be accompanied by formal transmittal indicating reason for

lateness. For submissions administered with evening deadlines, penalties would be assessed at 5% up to midnight, and 10% next day and each day afterward. 'Days' begin at midnight each day, and include weekends and holidays.

Academic Integrity:

In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. Refer to Academic Integrity website (<https://uwaterloo.ca/academic-integrity/>) for details.

A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70 (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-70>) Student Petitions and Grievances, Section 4. When in doubt, please contact the department's administrative assistant who will provide further assistance.

Discipline:

A student is expected to know what constitutes academic integrity to avoid committing an academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g. plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to Policy 71 (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71>) Student Discipline. For typical penalties check Guidelines for the Assessment of Penalties (<https://uwaterloo.ca/secretariat/policies-procedures-guidelines/guidelines/guidelines-assessment-penalties>).

Appeals:

A decision made or penalty imposed under Policy 70 (Student Petitions and Grievances) (other than a petition) or Policy 71 (Student Discipline) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals) www.adm.uwaterloo.ca/infosec/Policies/policy72.htm.

Note for Students with Disabilities:

AccessAbility Services (<http://uwaterloo.ca/disability-services/>), located in the new addition to Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the office at the beginning of each academic term.