

COURSE OUTLINE

Designing Out Waste: Architecture as Integrative Infrastructure for Sustainable Cities in the Context of Autonomous Transportation Systems

EVDA 782.07 Senior Research Studio in Architecture

Winter 2019 (F)

m, Tu, w, F 14:00-18:00 hrs.

Instructor: Prof. Joshua M. Taron, jmtaron@ucalgary.ca

Room: TBD + CBD Lab Studio

INTRODUCTION

The introduction of disruptive forces and major policies / regulatory instruments, including those related to emerging transportation technologies, are forecasted to bring a transformative wave of urban reform. For instance, while electric, autonomous and shared vehicles are expected to result in reduction of parking demand resulting in unprecedented opportunities for reclaimed inner-city space for urban densification, the anticipated increase in mobility and accessibility may induce further urban sprawl. These changes in urban form would impact supporting infrastructure, including building, water, energy, and waste systems, which in turn impact sustainability indicators of our cities such as ecological footprint, air and water quality, and greenhouse gas (GHG) emissions. To complicate matters further, individual urban infrastructure systems are increasingly becoming inter-dependent, as the impact on one will be felt in others. As an example, modifications to the transport network may impact the way urban forms and buildings function and are designed. Although it is inherently difficult to isolate and seek solutions to problems with individual infrastructure systems, existing academic programs are geared towards training architects and infrastructure engineers to achieve exactly this outcome. The silo-based approach of training architects and construction engineers fails because of the following three reasons:

- Failure to recognize the accelerated pace of the introduction of transformative and disruptive technologies and the need to anticipate the future scenarios impacting urban infrastructure.
- Lack of understanding of the integration between various infrastructure elements that present significant opportunities for synergies and transformational advancements.
- Lack of appreciation that sustainability of buildings and communities is a fundamental need.

On Buildings and Waste

In broad terms, waste stream diversion relies on sorting material such that it can then be recycled or reused. If material is not sorted properly, it is deemed contaminated and enters directly back into the waste stream. The infrastructure surrounding recycling is oriented around pushing the sorting process upstream prior to processing since it is labor intensive and cost prohibitive. Some of this infrastructure is felt in our everyday lives e.g. every time you sort your trash before throwing it away, you are providing free labor that makes diversion possible. While this may be a simple enough proposition for our day-to-day trash, it is a similar but much more complex problem when considering buildings as waste.

Presently, demolition is largely ignored when designing, regulating, analyzing and constructing buildings. While the financial and energy-related cost of demolishing any single building is admittedly minuscule and eliminates complexities of the project, their aggregate impact at the urban scale is significant and potentially unsustainable - constituting approximately 20% of the current flow into landfills and categorized as C&D Waste. Realizing the economic and environmental challenges that C&D waste poses, cities (including the City of Calgary) are now classifying it as one of 4 primary waste streams and turning toward tactics of diversion in an effort to mitigate and contain the growth of their landfills. This categorization coincides with a shift in their gaze toward the already-built-environment knowing that infill development in the context of a strong housing market is accelerating C&D waste production. But questions of design remain and architecture itself, while also guilty of having largely ignored issues surrounding C&D waste, is also uniquely equipped to aid in addressing its complexities. For example, how can we transform buildings as waste into valuable material banks? How does the selection and assembly of particular building materials contribute to the production of C&D waste? How might alternative modes of construction, prefabrication and or building assembly augment the production of waste? And how can the design of buildings produce value out of existing waste streams?

OBJECTIVES

The overall objective of the studio is to consider ways in which buildings can be designed such that they reduce the embodied and operational energy of buildings while simultaneously diverting building materials from landfills.

TEACHING APPROACH

This studio will function within a research-based model that includes:

- 1.) Literature Review of Transportation + Waste Infrastructural Systems
- 2.) Design + Design Methodology Development (emphasis on making use of CBD Lab Resources)
- 3.) Simulation + Prototyping
- 4.) Exhibition Design + Production
- 5.) Documentation + Publication

Emphasis will be placed on querying the already-built environment at a variety of while subscribing to circular economy design principles. It should also be understood that each phase will overlap with the next in order to ensure a high degree of legibility throughout the duration of the studio. There will also be a series of office-hosted research presentations that the studio will attend.

COURSE SCHEDULE

Jan 10-25	Phase 1.1: Literature Review
Jan 15-Feb 1	Phase 1.2: Design Methodology Development
Jan 22-Feb 15	Phase 1.3: Design Proposal Development
Feb 15	Phase 1 Review
Feb 17-24	Term Break
Feb 8-Mar 8	Phase 2.1: Simulation Development
Feb 25-Mar 29	Phase 2.2: Prototype Development
Mar 29	Phase 2 Review
Apr 1-24	Phase 3: Exhibition Design + Production
Apr 9-18	Final Review Prep
Date TBD	Final Review
Apr 25	Exhibition Completed
Apr 26	Exhibition Opening

COURSE EXPECTATIONS AND MEANS OF EVALUATION

Students will be expected to complete all course assignments and attend all studio sessions and reviews for their fully scheduled times. The following is the general breakdown of assignments:

Phase 1:	30%
Phase 2:	30%
Phase 3:	30%
Research Documentation:	10%

All assignments will be evaluated in terms of focus (clarity), research effort (iteration + exploration), organization (structure) and support (documentation).

REQUIRED READINGS

Jensen & Taron, *Designing Out Waste*

CACB CRITERIA

The following CACB Student Performance Criteria will be covered in this course at a primary level: B1: Design Skills; B2: Program Preparation; B4: Sustainable Design; B11: Building Materials; C1: Detailed Design Development; C2: Building Systems Integration.

The following CACB Student Performance Criteria will be covered at a secondary level: A3: Graphic Skills; Structural; Systems; B9: Building Envelopes; C3: Technical Documentation.

NOTES

1. Written work, term assignments and other course related work may only be submitted by e-mail if prior permission to do so has been obtained from the course instructor.
2. Academic Accommodations. Students who require an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to their Instructor or the designated contact person in EVDS, Jennifer Taillefer (jtaillef@ucalgary.ca). Students who require an accommodation unrelated to their coursework or the requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Vice-Provost (Student Experience). For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/
3. Plagiarism - Plagiarism involves submitting or presenting work in a course as if it were the student's own work done expressly for that particular course when, in fact, it is not. Most commonly plagiarism exists when:(a) the work submitted or presented was done, in whole or in part, by an individual other than the one submitting or presenting the work (this includes having another impersonate the student or otherwise substituting the work of another for one's own in an examination or test),(b) parts of the work are taken from another source without reference to the original author,(c) the whole work (e.g., an essay) is copied from another source, and/or,(d) a student submits or presents work in one course which has also been submitted in another course(although it may be completely original with that student) without the knowledge of or prior agreement of the instructor involved. While it is recognized that scholarly work often involves reference to the ideas, data and conclusions of other scholars, intellectual honesty requires that such references be explicitly and clearly noted. Plagiarism is an extremely serious academic offence. It is recognized that clause (d) does not prevent a graduate student incorporating work previously done by him or her in a thesis. Any suspicion of plagiarism will be reported to the Dean, and dealt with as per the regulations in the University of Calgary Graduate Calendar.
4. Information regarding the Freedom of Information and Protection of Privacy Act (<http://www.ucalgary.ca/secretariat/privacy>) and how this impacts the receipt and delivery of course material
5. Emergency Evacuation/Assembly Points (<http://www.ucalgary.ca/emergencyplan/assemblypoints>)
6. Safewalk information (<http://www.ucalgary.ca/security/safewalk>)
7. Contact Info for: Student Union (<http://www.su.ucalgary.ca/page/affordability-accessibility/su-structure/contact-info>); Graduate Student representative(<http://www.ucalgary.ca/gsa/>) and Student Ombudsman's Office (<http://www.su.ucalgary.ca/page/quality-education/academic-services/student-rights>).
8. Students will be expected to complete each of the course assignments. There will be no final exam. Students must obtain an overall passing grade to pass this course, however, if a student receives a grade less than B- for any assignment worth 30% or more, the student will receive an F grade for the course.
9. At the discretion of the instructor, assignments submitted after the deadline **may** be penalized with the loss of a grade (e.g.: A- to B+) for each day late. The following equivalencies (the University of Calgary has no official percentage scale system) will be used in calculating grades: **A+** (95.0-100.0); **A** (90.0-94.99); **A-** (85-89.99); **B+** (80.0-84.99); **B** (75.0-79.99); **B-** (70.0-74.99); **C+** (65.0-69.99); **C** (60.0-64.99); **C-** (55.0-59.99); **D+** (50.0-55.99); **D** (45.0-49.99); **F** (0-44.99).
10. A student who receives a "C+" or lower in any one course will be required to withdraw regardless of their grade point average (GPA) unless the program recommends otherwise. If the program permits the student to retake a failed course, the second grade will replace the initial grade in the calculation of the GPA, and both grades will appear on the transcript. Final grades will be reported as letter grades, with the final grade calculated according to a 4-point range. Assignments will be evaluated by percentage grades with their letter grade equivalents as shown.
11. Academic Accommodations. Students who require an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to their Instructor or the designated contact person in EVDS, Jennifer Taillefer (jtaillef@ucalgary.ca). Students who require an accommodation unrelated to their coursework or the requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Vice-Provost (Student Experience). For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/