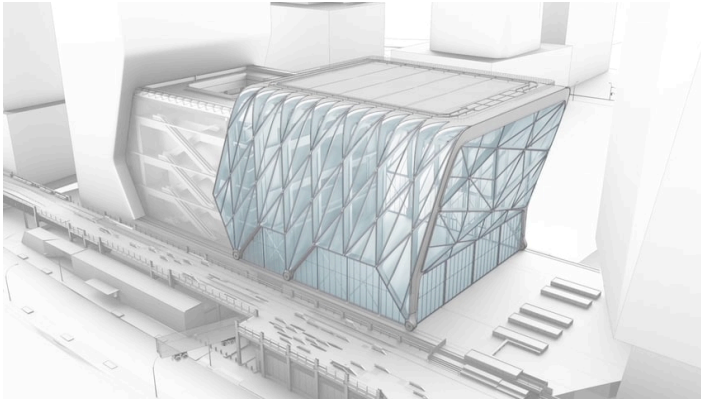


## Responsive Architecture Seminar

EVDS 683.88 H (3-0)

Instructor: Vera Parlac, [vera.parlac@ucalgary.ca](mailto:vera.parlac@ucalgary.ca)  
Class Time: Tuesday, Friday, 10:50-12:20 am  
Location PF2110

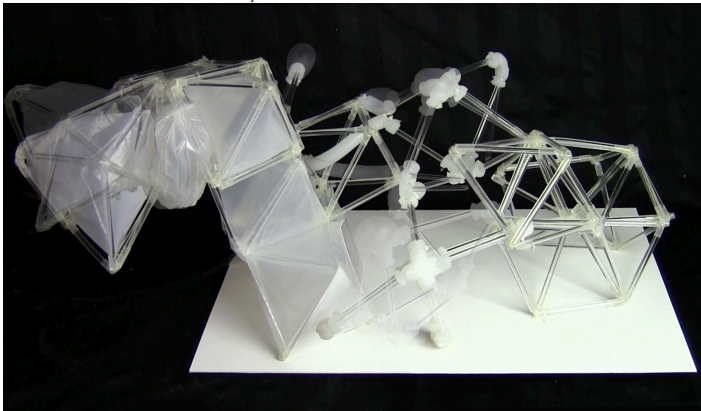
Winter 2019



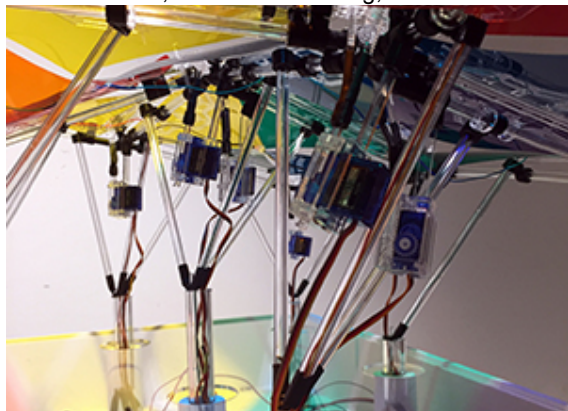
Diller Scofidio + Renfro, THE SHED



Enric Ruiz Geli, Media TIC building, Barcelona



Student project



Student project

## INTRODUCTION

Over the past decade, there has been an increasing interest in exploring the capacity of built spaces to respond dynamically and adapt to changes in the external and internal environments and to different patterns of use. Such explorations are technologically and socially motivated, in response to recent technological and cultural developments. Advances in embedded computation, material design, and kinetics on the technological side, and increasing concerns about sustainability, social and urban changes on the cultural side, provide a background for responsive/interactive architectural solutions that have started to emerge.

The class will focus on theories behind the responsive architecture and on the field of responsive architecture in general. It will examine architecture in relation to the latest research in biology, material science, synthetic biology, bioengineering, and will address possible shifts in imagining and re-envisioning materialization of architecture. The course will underline architecture's inseparable link to technology and speculate on new possibilities for architecture that is integrated, responsive, adaptive and productive participant within larger ecologies.

## **OBJECTIVES**

1. To learn about developments that had brought forward ideas of responsive architecture.
2. To expand the understanding of the responsive systems and their role in architecture.
3. To engage broader social and technological issues triggered by the deployment of responsive systems.

## **TEACHING APPROACH**

This seminar course has two aspects. At the beginning of the semester course topics will be presented in a form of lectures. Readings will be assigned and discussions conducted during the first part of the semester. Students will have an opportunity to further engage the course topic by developing a small scale design research project on dynamic systems. The project consultations will be held during the classes, with class discussions and reviews conducted as needed.

## **CONTENT: Topic Areas and Detailed Class Schedule**

As the external socio-economic, cultural, and technological context changes, so do conceptions of space, shape, form and performance in architecture. Over the past decade, we have seen an increasing interest in exploring the capacity of built spaces to respond dynamically to changes in the external and internal environments. The idea that two-way relationships could be established among the space/component/surface, the environment, and the users is not new. The first concepts of an adaptive, responsive architecture were born in the late 1960s and early 1970s, primarily as a result of parallel developments in cybernetics, artificial intelligence, and information technologies. This class is interested in the territory where the cybernetics and architecture meet. New digital technologies of modeling, fabrication and simulation, new materials and material technologies, and responsive architecture informed by mechatronics and robotics have an extensive impact on the way we build and imagine architecture. Responsive Architecture seminar explores the importance of those new technologies in contemporary design. The course will cover the following topics:

1. Architecture and kinetics
2. Architecture and biology
3. Architecture and matter
4. Architecture and sentience

Week 1

(Jan 11) Introductory lecture

Week 2

(Jan 15) Architecture and matter

(Jan 18) Architecture and kinetics

Week 3

(Jan 22) Discussion

(Jan 25) Architecture and biology

Week 4

(Jan 29) Architecture and sentience

(Feb 01) Discussion

Week 5

(Feb 05) Project discussion and proposals

(Feb 08) Consultation

Week 6

(Feb 12) Project Proposal

(Feb 15) Consultation/Project development

Week 7 (Feb 18 and 23) READING WEEK

Week 8

(Feb 26) Consultation/Project development

(Mar 01) Consultation/Project development

Week 9

(Mar 05) Consultation/Project development

(Mar 08) Consultation/Project development

Week 10 (Mar 11-15) BLOCK WEEK

Week 11

(Mar 18) Consultation/Project development

(Mar 22) Review

Week 12

(Mar 25) Consultation/Project development

(Mar 29) Consultation/Project development

Week 13

(Apr 02) Consultation/Project development

(Apr 05) Consultation/Project development

Week 14

(Apr 09) Consultation/Project development

(Apr 12) Presentation

## **MEANS OF EVALUATION**

Students are expected to complete all assignments and attend all lectures and reviews. Students will also be expected to read any assigned readings. The course evaluation will be based on written observations of the assigned readings (four), a course project and a project portfolio.

Students will meet with the instructor to present weekly progress of the studio project (see schedule).

Between the second and sixth week students are expected to read assigned texts and to write their observations and present them in class as points for a class discussion.

Observations on readings	10%
Course assignment	75%
Course assignment research report/portfolio	15%

## **GRADING SCALE**

The EVDS standard grading scale will be used in all evaluations for this course.

A+ (95-100), A (90-94.99), A- (85-89.99), B+ (80-84.99), B (75-79.99), B- (70-74.99), C+ (65-69.99), C (60-64.99), C- (55-59.99), D+ (50-54.99), D (45-49.99), F (0-44.99)

Final grades will be reported as letter grades, with the final grade calculated according to the 4-point range. All project phases will be evaluated by percentage grades, with their letter grade equivalents as shown.

Grade	Grade Point Value	4-Point Range	Percent	Description
A+	4.00	4.00	95-100	Outstanding - evaluated by instructor
A	4.00	3.85-4.00	90-94.99	Excellent - superior performance showing comprehensive understanding of the subject matter
A-	3.70	3.50-3.84	85-89.99	Very good performance
B+	3.30	3.15-3.49	80-84.99	Good performance
B	3.00	2.85-3.14	75-79.99	Satisfactory performance
B-	2.70	2.50-2.84	70-74.99	Minimum pass for students in the Faculty of Graduate Studies
C+	2.30	2.15-2.49	65-69.99	All final grades below B- are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements.
C	2.00	1.85-2.14	60-64.99	
C-	1.70	1.50-1.84	55-59.99	
D+	1.30	1.15-1.49	50-54.99	
D	1.00	0.50-1.14	45-49.99	
F	0.00	0-0.49	0-44.99	

**Notes:**

1. 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.
2. Students are expected to complete all course assignments on time. There will be no final exam. Students must obtain an overall passing grade to pass this course, however, if a student fails any phase of the course worth 30% or more they will fail the course. A student who feels that a piece of graded term work (term paper, essay, test, etc.) has been unfairly graded may request to have the paper re-graded. The student shall discuss the work with the instructor within fifteen days of being notified of the mark or of the item's return to the class. More information can be found in the Graduate Calendar: <http://www.ucalgary.ca/pubs/calendar/grad/current/gs-o.html>

**READINGS**

Michael Hensel and Achim Menges, *Morpho-Ecologies: Towards Heterogeneous Space In Architecture Design*, AA Publications, 2007, p. 28 – 52

Michael Fox and Miles Kemp, *Physical Change*, in *Interactive Architecture*, Princeton Architectural Press, New York, 2009.

[http://la.remap.ucla.edu/puppetarch/images/7/72/Fox\\_Kemp.Interactive\\_Architecture.pdf](http://la.remap.ucla.edu/puppetarch/images/7/72/Fox_Kemp.Interactive_Architecture.pdf)

Leroy Cronin, *Defining New Architectural Design Principles With 'Living' Inorganic Materials*, in Spiller, N. and Armstrong, R., (eds), *Protocell Architecture*, Wiley, 2011, p. 34-43

[http://issuu.com/ani.arzumanyan/docs/protocell\\_architecture](http://issuu.com/ani.arzumanyan/docs/protocell_architecture)

Katherine Hayles, *Liberal Subjectivity Imperiled*, in *How We became Posthuman*, The University of Chicago Press, 1999, p. 84 – 112

Additional texts and references will be provided in relation to project topics

**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. Submissions must come from an official University of Calgary (ucalgary) email account.

2. Academic Accommodations. Students who require an accommodation in relation to their coursework or to fulfil 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](mailto: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/](http://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. Appeals: If a student has a concern about the course, academic matter, or a grade that they have been assigned, they must first communicate this concern with the instructor. If the concern cannot be resolved with the instructor, the student can proceed with an academic appeal, which normally begins with the Faculty: <http://www.ucalgary.ca/provost/students/ombuds/appeals>
5. Information regarding the Freedom of Information and Protection of Privacy Act (<http://www.ucalgary.ca/secretariat/privacy>)
6. Emergency Evacuation/Assembly Points (<http://www.ucalgary.ca/emergencyplan/assemblypoints>)
7. Safewalk information (<http://www.ucalgary.ca/security/safewalk>)
8. Contact Info for: Student Union (<https://www.su.ucalgary.ca/contact/>); Graduate Student representative(<https://gsa.ucalgary.ca/about-the-gsa/gsa-executive-board/>) Student Union Wellness Centre: <https://www.ucalgary.ca/wellnesscentre/>; Library Resources: <http://library.ucalgary.ca/> and Student Ombudsman's Office (<http://www.ucalgary.ca/ombuds/>).
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