

## **Responsive Architecture Seminar**

**EVDA 697.7 Q(1.5-0)**

Instructor: Vera Parlac, [vera.parlac@ucalgary.ca](mailto:vera.parlac@ucalgary.ca)  
Class Time: Friday, 9:30-10:50 am  
Location: PF2110

Winter 2017

### **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 there will be series of lectures covering major topics of the course. Readings will be assigned and discussions conducted during the first five weeks of the course. Students will have an opportunity to further engage the course topic by analyzing two responsive architecture projects or by developing a small scale design research project focusing on dynamic systems (physical or digital). Consultations about their research or project will be conducted on a weekly basis in the second part of the semester with two presentations during that time.

### **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, matter and formation
4. Architecture and cyborgs

Week 1 (Jan 13)

Introductory lecture

Week 2 (Jan 20)

Architecture and kinetics

Week 3 (Jan 27)

Architecture and biology

Week 4 (Feb 03)

Architecture, matter and formation

Week 5 (Feb 10)

Architecture and cyborg

Week 6 (Feb 17)

Project Proposal

Week 7 (Feb 24)

BLOCK WEEK

Week 8 (Mar 03)

Consultation

Week 9 (Mar 10)

Consultation

Week 10 (Mar 17)

Presentation

Week 11 (Mar 24)

Consultation

Week 12 (Mar 31)

Consultation

Week 13 (Apr 07)

Presentation

## **MEANS OF EVALUATION**

The course evaluation will be based on assignment completed during the term. Students can chose between:

1. Case studies – Students are to undertake an analysis and comparison of two responsive architecture projects. The list of case studies will be provided and the choice of the project will be made in consultation with the instructor.
2. Small-scale prototype that addresses dynamics and flows – Physical prototype
3. Simulation of a dynamic and interactive system that relates to a component or larger architectural system – Digital Prototype

Regardless of the chosen assignment students will meet with the instructor to present weekly progress of the assignment.

Between the second and fifth week students are expected to read assigned texts and to write Critical Evaluation (CE's) of each assigned text.

Critical Evaluations	10%
Weekly progress of the course assignment	10%
Course assignment	80%

## 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.

## READINGS

- Week 1 Introduction
- Week 2 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)
- Week 3 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)
- Week 4 Michael Hensel and Achim Menges, Morpho-Ecologies: Towards Heterogeneous Space In Architecture Design, AA Publications, 2007, p. 28 – 52
- Week 5 Katherine Hayles, Liberal Subjectivity Imperiled, in *How We became Posthuman*, The University of Chicago Press, 1999, p. 84 – 112
- Week 6 – 13 Students will be working on their assignments and have regular consultations with the instructor. Students will present their projects on the week 10 and 15.

## 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. 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.

3. 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
4. Emergency Evacuation/Assembly Points (<http://www.ucalgary.ca/emergencyplan/assemblypoints>)
5. Safewalk information (<http://www.ucalgary.ca/security/safewalk>)
6. 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>).
7. 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 fails any phase of the course worth 30% or more they will fail the course.
8. 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).
9. 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.
10. 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/)