

Senior Research Studio in Architecture

EVDA 782.04 F(0-8)

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Class Time: Tu, Fr 2:00 – 6:00 pm

Winter 2017

RESPONSIVE ARCHITECTURE

INTRODUCTION

Senior Research Studio in Architecture is a research design studio in which students collaborate with design faculty in exploring projects that engage contemporary issues defining the built and natural environments. Students choose topics outlined by faculty research expertise.

EVDA 782.07 Section of the Senior Research Studio in Architecture will focus on responsive architecture and will explore a territory beyond the stasis in architecture. The aim to develop responsive (building) systems/components is grounded in a position that the built world should operate synergistically within larger ecologies. And in return the responsive building systems could act as ecologies in themselves. This approach positions architecture as a discipline that creates built ecologies. It also enables the architectural discipline to re-calibrate its participation in larger systems (larger ecologies) and become a more intelligent and operative participant.

The following CACB Student Performance Criteria will be covered in this course:

Primary Level: B1: Design Skills.

Secondary Level: A3: Graphic Skills.

OBJECTIVES

- Demonstrate ability to embed research within the process of design.
- Demonstrate ability to raise relevant design questions within the research focus and address those questions through design
- Demonstrate ability to undertake all necessary analysis, synthesize the findings, and reach coherent conclusions that could be interrogated/tested through a design project,
- Demonstrate ability to employ appropriate graphic methods to convey essential design information at all stages of a design process.
- Demonstrate understanding of the ecological role of a building.
- To expand the understanding of the responsive systems and their role in architecture.
- To engage broader social and technological issues triggered by the deployment of responsive systems.
- To develop fundamental knowledge in mechatronics and imbedded systems
- To apply the knowledge of mechatronics and imbedded systems towards a development of responsive systems/components/surfaces in architecture.
- To develop skills of interdisciplinary collaboration

Skills/Knowledge: Arduino platform, mechatronics, robotics, prototyping, applied design, design process.

TEACHING APPROACH

In this design studio course students are expected to develop their design project in response to a design studio brief articulated by the instructor. Student projects will be discussed during desk crits, informal and formal reviews. Short lectures will be given throughout the semester, and discussions of various issues arising from the project will be conducted. The studio is structured as an interdisciplinary environment with computational media design (CMD) students joining architecture students in forming design teams. Technical workshop will be offered to familiarize students with Arduino platform, sensors and imbedded systems. A teaching assistant from Computational Media Design program will provide technical help throughout the semester. The emphasis will be placed on creating a speculative yet rigorous environment for creative exploration.

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 studio 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 studio reflects the importance of those new technologies in contemporary design.

1. Overview of the history of responsive architecture
2. Cultural and social impact of the interactive technology
3. Dynamic structures in Nature
4. Imbedded systems
5. New materials and material systems
6. From prototype to an architectural proposal

Phase 1	Research, Project Articulation, Basic skills Tuesday Jan 10 – Tuesday Jan 24	10%
Phase 2	Project proposal Prototyping Tuesday Jan 24 – Friday Feb 10	20%
Phase 3	Project proposal Conceptual Stage Friday Feb 10 – Friday March 03	20%
Phase 4	Project Development Prototyping Friday Mar 03 – Friday March 24	20%
Phase 5	Final project proposal (25%) and research report (5%) Friday March 24– Tuesday April 12	30%

MEANS OF EVALUATION

Students will be expected to follow all assignments, to be present in studio on Tuesdays and Fridays (and as otherwise required by the schedule), and attend all lectures and reviews. Students will also be expected to read any assigned readings.

The course evaluation will be based on assignments completed during the term, which includes research, project articulation, prototyping and various phases of an architectural proposal. 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.

All assignments, project progress and the final proposal will be evaluated in four areas:

- Research and design intent (20%)
Ability to articulate idea/focus/agenda/position and state it with conviction, clarity and intent and ground it in appropriate research.
- Analysis, design thinking and development (30%)
Ability for design thinking (with rigor) through generative drawings and models that explain, support and document design proposal development/process.
- Content and organization (20%)
Ability to relate disparate design information to individual design position and develop a coherent design proposal
- Documentation – (30%)
Ability to employ appropriate media and clearly represent design proposal

GRADING SCALE

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

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).

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

BOOKS:

Branko Kolarevic and Vera Parlac, *Building Dynamics: Exploring Architecture of Change*
Neeraj Bhatia and Lola Sheppard, *Bracket--Goes Soft--Almanac 2*
Beesley Philip, *Responsive Architectures: Subtle Technologies 2006*
Saarah Bonnemaision and Christine Macy, *Responsive Textile Environments*
David Benjamin + Soon-in Yang, *Life Size* <http://dl.getdropbox.com/u/224134/LifeSize-1.pdf>
Michael Fox and Miles Kemp, *Interactive Architecture*
Robert Kronenburg, *Flexible: Architecture that Responds to Change*
Bullivant Lucy, *4dsocial: Interactive Design Environments*
Bullivant Lucy, *4dspace: Interactive Architecture*
Sean Lally, *The Air from Other Planets*
R. el-Khory, C. Marcopoulos, C. Moukheiber, *Make Alive: Prototypes for Responsive Architectures*
M. Kretzer, L. Hovestadt, *Alive: Advancements in Adaptive Architecture*

WEB SOURCES:

http://www.ted.com/talks/rachel_armstrong_architecture_that_repairs_itself.html
http://www.youtube.com/watch?v=Vps__XdjZTk
<http://www.youtube.com/watch?v=kXPWih97w-4&NR=1>

<http://www.youtube.com/watch?v=gNEILvRqQ5w&NR=1>
<http://www.youtube.com/watch?v=SDInSy2C2NA>
<http://www.thelivingnewyork.com/>
<http://caad-eap.blogspot.com/>
http://www.sciarc.edu/sciarc_player.html?vid=http://www.sciarclive.com/Lectures/2010_09_29_DavidBenjamin.flv&title=David Benjamin

Other texts might be suggested throughout the semester

SPECIAL BUDGETARY REQUIREMENTS

EVDA 782 - Senior Arch. Studio (all sections) \$100.00

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). 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/