Prospectus

DESIGN EXPERIMENTATION. I bring to thesis an interest in creativity, drawn from my experiences from working with the arts, biology, industrial design, computer science, and architecture. I also bring a strong interest in design experimentation at 1:1 scale and developing ideas through playful making and testing. As a teacher, I am interested in encouraging curiosity, learning, and innovation. As an architect, I am interested in bringing thoughtful and socially relevant architectural experiments into the world through the equitable engagement of hand and mind.

TOPIC. The umbrella topic is ‘Responsive Architecture’ and posits that a more artful, resilient, and systems-based approach to design will better serve humanity. Under this umbrella of open-ended architectural research, we will develop thoughtful and potentially disruptive interventions in environmental contexts, be they densely urban conditions, post industrial cities, degraded farmland, or other areas that could benefit from exploratory design thinking. Projects may be developed individually or collectively; in either case, the studio is structured as a design collaborative that supports the free exchange of ideas.

Project by thesis student Ryan Daley. Emphasis on construction methods and developing ideas through digital and physical models.
BACKGROUND. I came to architecture through commercial fishing and ships carpentry. From commercial fishing, I learned the benefits of teamwork, especially in adverse weather conditions when survival is at risk. From ships carpentry I learned a respect for materials, tools, and craft. From sailing and study of nature, I realized there is often a correlation of form and performance that we intuitively recognize. We understand this relationship as beauty, often prior to forming rational thought. This observation has led me to value the intuitive and emotive processes of design in tandem with more rational methods. I view design as a creative endeavor that draws from the arts and the sciences.

WHY. During thesis, we will apply your thoughts and skills to positively effect people’s lives through design. This search will take a variety of paths dependent on your individual | collective interests and experiences. We will explore the artistic, poetic, and pragmatic aspects of our field, and with this spirit, we will develop highly imaginative propositions that will impact current societal issues through the medium of architecture.

I believe that small things can make big differences and that great things start from the bottom up.

Summary
It’s all about creativity and social relevancy. We work hard together. The process of digital and physical making, coupled with readings and studio discussions, are our daily fair. Materiality and how things are made are important to practical and theoretical development. Building a portion of the project at full scale is not required but is a possibility.
Adaptive Architecture

American author, marine biologist and conservationist, Rachel Carson stated "the control of nature is a phrase conceived in arrogance, born of the Neanderthal age of biology and philosophy, when it was supposed that nature exists for the convenience of man." Carson went further and identified the complex, interactive and interdependent network of life and made clear that human action disproportionately impacts the network. The control of nature has been a fundamental underpinning for architecture and engineering and they might well be added to the disciplines in Carson’s list. We are now entering a more responsive age of architecture, biology, and computation where the boundaries of our discipline are being redefined.

Advances in computation, technology, and philosophy (among other disciplines) have enabled designers to conceive of a built environment that is homeostatic – the biological condition where organisms maintain internal stability through the continuous exchange of matter and energy with the local environment. For an organism, exchange with the environment is critical for survival and well-being. Currently, there is a shift in building design toward systems that adapt to environmental variations such as in humidity, temperature, light, and pollution. Adaptive architectural design varies in its underlying strategies, from the computational and electronic to more passive material-based systems that are reactive to environmental stimuli. An equally important aspect of adaptive architecture is to engage the senses and appeal to the imagination.
Cloud Machine by Karolia Sobeka. Commentary on human proclivity to manipulate nature. The project references current scientific explorations to disperse clouds of reflective aerosols to form an artificial atmospheric layer to reflect incoming solar gain and reduce global warming.

On creativity and the culture of open knowledge exchange

Creativity (as outlined by the MacArthur Foundation) is regarded the human endeavor where individuals and teams gain new insight by connecting the seemingly unconnected in significant ways. Creativity is built upon risk-taking and a playful and experimental attitude - which requires confidence and ability to trust your intuition. As in the most creative design practices, it is our responsibility to construct a culture of experimentation and knowledge exchange within the thesis studio. In this sense, the studio is considered open-source, where ideas are freely exchanged and the momentum of the group benefits the individual.

Open source

These thoughts are structured on professional models I have experienced in multidisciplinary practice, specifically Molecular Geodesics (biotech) and IDEO (industrial design). These companies supported design-thinking skills in open-source, non-hierarchical working environments by positioning young designers next to experts, effectively giving knowledge, voice, and opportunity to young designers. Key to creative development in these companies was working with motivated and knowledgeable people and the free exchange of ideas.

The Fine Print: The thesis teaching method is directed but not prescriptive. This means you are curious and motivated to think for yourselves, to think your way into, and out of, a problem, and to invest time and energy to creatively address your thesis to the best of your ability. This may cause discomfort, as you will be supported but not be told precisely what to do. This teaching | learning method is a ‘loose fit’ model that is fluid and adaptable to new scenarios as they develop.
Adaptive system (Evolo competition) and Strandbeast by Theo Jenson. Jenson’s project illustrated a low-tech approach to a project that interacts with wind. The system serves as a responsive capacitor, harvesting and storing wind energy, and then moving when the energy is released.

FAQ

The questions below are intended to help you make decisions regarding choice of studio.

Will this course challenge the status quo and challenge me to bring about change in the world?
  • Yes.

Why do you teach?
  • I believe I can use my inclinations and experience to help others develop their creative voice. Accordingly, I have high standards and expectations such that I can help students to realize their potential.

Some things common to great teachers that I have had – and that I try to emulate:
  • They elevate your expectations of yourself, teach through demonstration, and encourage you to find alternate paths, disruptive technologies, and ideas that are not bound by the status quo.
  • They leave us with our own ideas. They leave us with the provocation to experiment and the desire to learn more – to make a difference.
  • They profess that we are not confined by our discipline, but empowered to exchange knowledge across disciplinary boundaries.

How is responsive architecture defined in this course?
  • Responsive architecture is adaptive to humans, animals, environmental stimuli, or other triggers. This definition is inclusive of both high and low tech studies, it is inclusive of both static and dynamic solutions, and it is inclusive of ephemeral and more durable speculations.

Can I construct my project at full-scale?
  • Yes

Do I have to construct my project at full-scale?
  • No, though I do ask that you learn from your models and that they ‘work’ in some way, meaning that you gain some sort of feedback from them. This could be observation of how people (or animals) interact with something you have made, or the model may interact with light, sound, . . . such that the construct is experiential and not representational.
I want to make a difference. Can I apply my interests to the real world?

- Yes. You may apply your work to current socially relevant issues. I only ask that your process is creative and rigorous, and takes a systems approach to design. For instance, I just met someone studying water policy in rural Indonesia. One might partner with a graduate student in the field of rural water policy and develop an innovative strategy | architectural solution that engages the problem of water harvesting, storage, and distribution – all while consider the local technological and social context.

Who else is involved in this studio?

- That’s up to us. In previous thesis courses, students have assembled committees that include experts from architecture and other fields. For instance, you may form a committee that includes a team from architecture, the arts and/or the sciences. If interested, I will help form committees that increase the depth and quality of your current work and potentially lead to future collaborations.

I’m into soft robotics, can I use an arduino? How about Grasshopper and maybe some genetic algorithms?

- Yes, but not required. I ask that students explore their ideas rigorously. This may include analogue or digital means, high-tech and/or low-tech explorations. We consider technology broadly, creatively, and intelligently.

Can I design more temporary, ephemeral systems, or does my project need to be more permanent?

- Design contributes to society in many ways. Some projects may last a mere instant while others may be highly durable. I ask that you consider the nature of materials and construction, regardless of permanence. In an initial project in the last lab I directed, a student installed air pollution sensors on kites (sensors reflected air quality with colored lights on the kite) and traveled to Beijing and flew them with a crowd of people. Her activist interests put power in the hands of an urban population by demonstrating air quality with a traditional activity (kite flying). This type of project could imaginatively lead directly to architectural application.

Will this course set me up for graduate work?

- Yes. The coursework supports an ethic of discovery through design research, qualities that will support a strong graduate school portfolio.

Will this course set me up to enter a research-based practice?

- Yes. I expect that students could apply to research-based practices such as Kieran Timberlake and ARUP, enter research pods within offices such as the Advance Geometry Group at SOM and the architectural research group at Perkins and Will. The coursework will also support those that plan to start their own critical practice.
What’s construction got to do with it?

- I am a strong proponent of developing and testing ideas though making 1:1 scale design experiments. I believe that creativity often stems from immersion in a problem and from the equitable engagement of hand and mind.
- Thinking through the fingertips. I believe that ideas are often generated from physical engagement – in our field, that is the act of making, of constructing, of bringing into existence. Often during this process, possibilities are uncovered and ideas formed.

OK, what about project ideas. What kinds of projects are ok?

- Most any project, as long as it is undertaken with rigor, proceeds experimentally, is compelling, and is responsive in some way.
  - For instance, if one was interested in the water cycle and adaptive reuse, perhaps we could approach the problem of water collection, purification, and distribution within existing unused grain silos. With research, we might find that we need to keep water within a certain temperature range, which leads to architectural approaches that are adaptive, and enable the silo to respond to local environmental conditions.
  - Or, if soft robotics is of interest, one might search for more resilient and pliant means of making buildings by researching the potential of emergent materials that give architecture the agency to operate in new or adverse conditions.
- So there are lots of possibilities!

Will this class require a lot of work?

- Yes

Will this class be a lot of fun?

- Yes. The course is built on playful design experimentation, taking risks, and intellectual, emotive, and design growth.

Contact me if you have questions.
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In an increasingly globalized world it’s nice to reaffirm a way of making architecture about place – its landscape, climate and material culture.” MacKay Lyons, Ghost Studio, Experiments in Wood Framing. I find these projects inspiring for their nuanced approach to the tradition of wood framing. The projects challenge one to reconceive the way we use ‘off-the-shelf’ building products. So, with a given amount of relatively low-cost material, how might you challenge the way we build?

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The studio “engages the development and employment of a design project (most often - but not limited to - a building proposal) that demonstrates the findings, proposals, and challenges resulting from the thesis inquiry. In essence, the studio consists of a hypothetical, built demonstration of the thesis inquiry.”

Prof. Jonathon Foote

Self-deploying sponge mats for oil collection after a spill. Exploration of geometry, computational form-finding, and temperature reactive materials. Student project

At the intersection of architecture, ecology and related disciplines, the coursework draws from the creative application of vernacular and emergent building technologies. Site, environment, infrastructure, culture, morphology, materials and fabrication process are key drivers for project development. Emphasis is placed on developing working models and gaining feedback by recording these models in the environment.
Project scope in thesis studio is broad and may include rethinking traditional means of adaptation (operable components such as doors, windows, roofs and walls) or more speculative means of adaptation (emergent materials and technology transfer from other fields). Projects will engage design at a range of scales: component, building systems, urban systems, and ecological systems – and during term 3, we will resolve projects to a high level of detail. The research-based studio will draw from the arts and the sciences, and from the topical areas below. The image of the Ghost project on the proceeding page is example of materials research, construction technology, and tech transfer from shipbuilding.

Materials research
• Rethinking traditional materials of the study of emergent materials that give architecture the prospect to exist in varied conditions. For instance, previous projects have studied methane capture for construction on disrupted biotopes such as landfills.

Construction technology
• In-depth study of methods of assembly. These may include study of traditional framing systems (Ghost Studio) or the craft of wooden boat building. Study may also include more advanced and speculative methods of construction including technology transfer from the automotive industry, aeronautics, or composite Americas Cup sailing technology. The field is open.

Systems thinking | Learning from nature
• This area is of interest to better understand the porous boundaries between living and non-living systems and to view nature as a model network of interactive systems, and to observe that animals and plants have evolved a large variety of reliable and relatively simple mechanisms to adapt to environmental fluctuation.

Technology transfer
• Study of a field that may bring new prospects to architecture. The field is up to you and could vary from bicycle mechanics to biology.

Projects may be individual or collaborative
Collaborative projects must be accompanied by an approved work plan. I support individual and collaborative efforts and help determine if collaboration is the best path.

Fall
Design experiments and methods
Materials and construction technology
Abstract Show
Velum
Thesis book

Winter
Systems design and architectural application
Book Show Installation and Section Show
Shared Thesis Critique

Spring
Detail Show 3 and Final Show 4

Field trips are in the works.
492 Seminar Description_ F

Seminar is dedicated to:
- developing flexible, self-directed curricula for the thesis year;
- identifying interests and developing a body of research; and
- writing of the thesis proposal.

The thesis is distinct from the thesis project, which will be developed in studio. During the seminar, we will identify thesis topics, their historic underpinnings, and their currency in the field of architecture. We will identify core knowledge within our own field and look to advancements in adjacent fields (the arts, engineering, botany, materials science, . . .) and search for moments that spur innovation in our own field.

Who am I?

I came to architecture through commercial fishing and ships carpentry (working on wooden sailboats). From ships carpentry I learned a respect for materials and craft. From sailing and study of nature, I realized there is often a correlation of form and performance that we intuitively recognize and we understand this relationship prior to forming rational thought. This observation has led me to value the intuitive and emotive processes of design in tandem with more rational methods (in case you did not see this on the first page).

On the academic side I studied installation art, industrial design and architecture at Pratt Institute in Brooklyn. At Pratt, I learned to value the visual arts and to value diversity of thought. These studies led me to graduate work at MIT where I partnered with mechanical and biomedical engineers where I learned to value the humanity of technology. I then (with J. Vollen and A. Malo) founded the Emerging Material Technologies program at the University of Arizona where we looked closely at materials and fabrication process to develop responsive architectural propositions. Most recently, I have directed the CoDe Lab at Carnegie Mellon University where I worked with architects, artists, and computer scientists to explore the poetic, tangible, and interactive prospects of technology.
OK this is getting long, but I've forgotten to mention working on projects with BuroHappold and NASA. Well, just one more, I also had the privilege to work with a creative engineering team on exoskeletal suits, an early exploration in soft robotics to increase the abilities of the human body, specifically duration and performance.

More to come.

Biomimetic study of the self-shading properties of the cactus applied to building tiles. The digital tile model was scripted to generate optimized surface topographies that apply to different latitudes and orientation to provide optimal shading.

Projects demonstrating use of branching algorithms and close-packing algorithms. Evolo completion entry, Gabiel. The project on the right was digitally generated from a physical model.
Is this studio for me?

Are you:

- interested in developing your voice and having an impact on society?
- motivated to explore the territory of thinking and making?
- ambitious and prepared to challenge yourself?

Do you:

- view architecture as sets of interlocking systems rather than static entities?
- have interests outside of the field of architecture that may contribute to the creative prospect of our field?

Inspirational groups | places

- Institute for Advanced Architecture in Catalonia
- Cranbrook thesis full scale constructs
- Architectural Association
- Poly Canyon
- Heatherwick Studio
- Ghost Studio (MacKay Lyons)
- Harvard Innovation Lab
- CMU CoDe Lab
- CASE RPI
- Terraform 1
- Zimoun
- Archigram
- Theo Jansen
- Karolina Sobeka (Sniff | Cloud Machine)

Add you inspirational interests here

This is a short list of inspirational sources that have motivated me. It gives insight into the potential of developing cross-disciplinary and provocative design solutions that have meaningful social impact.
## Thesis

The Umbrella Topic and the Creative Process boxes are common to the course. The Interests box contains suggestions that serve to inform the thesis research. For instance, one could pick a few from this category such as 'Learning from nature' and 'Construction technology' and begin to conceive of a question such as 'Could we alter current construction practices based on observations of evolution in nature?'

OR you may bring other interests to the table.

### Umbrella Topic
- Responsive systems

The topic is broad and can range from rethinking the basic operable elements of buildings (doors, windows, screens) to tech transfer from biology or robotics. Regardless of the topic, you will be asked to develop your thesis to the extents of your imagination. Responsiveness and adaptability are the umbrella idea that is common to the studio.

### Interests
- Learning from nature
- Construction technology
- Technology transfer
- Rethinking traditional materials
- Emergent material technology
- Low tech | High tech
- Activism
- Nordic architecture
- Entrepreneurship
- **Insert your interests here and here**

These interests drive the thesis study and have currency in the field of architecture. I've listed some possibilities. Of course you can add your own perspective.

### Creative Process
- Play
- Morphology
- Working models
- 1:1 scale construction

These are suggestive of methods to tap into the creative process from my experience at IDEO and MGI. They are rigorous and open-ended means of idea exploration and development.

Morphology is taken from Goethe and Darcy Thompson as a means of expanding design prospects, and is the underlying idea behind algorithmic thinking.

1:1 construction and working models are key to developing things that actually work - they also uncover nuances that could not have been predetermined. They are recursive and give real-time qualitative feedback.