Micro-housing for affordability, flexibility and sustainability

Course Instructors:

Elizabeth Antczak, eantczak@uwaterloo.ca

John McMinn, <u>icmcminn@uwaterloo.ca</u> (studio coordinator) Class hours: Mondays and Thursdays 9:00-12:30, 1:30-6:00pm

Class location: Arch 393 Micro-housing studio and UWSA courtyard and shop

Office location: 3009

Office hours: Mondays and Thursday 8:30-9:00 (please e-mail the instructors to schedule)



Georgetown Village (Hybrid Typology) Drawn by Marco Chow and Fiorella Granda

TERRITORIAL ACKNOWLEDGEMENT:

The School of Architecture is located on the traditional territory of the Neutral, Anishinaabeg and Haudenosaunee peoples. The University is situated on the Haldimand Tract, the land promised to the Six Nations that includes 10 kilometres on each side of the Grand River.

COURSE DESCRIPTION:

The question of housing, where people can live and what form of dwelling they can occupy, and the relationship of dwellings to their surrounding context, these days are in the news, and in political

discourse at all levels of government. The current turmoil within the Ontario provincial government with the recent resignation of the Ontario Government Housing Minister over the controversial removal of land from the Greater Toronto Greenbelt to create housing, is just one of many examples, of the way in which acute housing shortages have become a key issue which has reverberations across a wide spectrum of our society.

The question of what types of housing can address the acute housing shortages in Ontario and across the country, is a key issue in which architects can importantly have a role to play. Housing insecurity is at a level of crisis not seen in decades. Interesting large-scale models for provision of affordable housing can be found in parts of Europe and Scandinavia for example, through governmental policy decisions based on the idea of housing as a human right. These examples of large government resources directed toward the problem, has been shown to have a profound positive social and economic impact in the larger society.

Canada once had a renowned reputation for building affordable housing, but in recent decades little has been done to support affordable housing, particularly in Ontario, at the level needed to address the acute housing shortage. By contrast at a grass roots level in many communities, small scale housing initiatives have been emerging, particularly in the areas of co-housing and micro-dwellings. As individuals, and in the architectural profession we understand impacting larger governmental policy decisions on housing may be beyond our reach, but engaging with local initiatives, particularly with small scale buildings such as tiny homes is completely within reach. The cumulative impact of many local small scale local initiatives, when iterated across many communities, can aggregate to have a significant impact on housing shortages and homelessness.

This studio is focused on housing insecurity in the Waterloo Region, and explores the potential of low cost small scale building that could be widely deployed as a means of quickly created, much needed housing, for growing segment of our communities.

The studio attends to this crisis through the construction of a fully operational tiny home prototype, to serve as transitional housing for individuals who have experienced homelessness or housing insecurity in the region. The studio explores the principles of, design, technology and fabrication of small dwellings, whose modest size, mobility and economy can play a key role in addressing the acute housing crisis both within the local region and across the country. The studio will involve the design and building of an approximately 190 square foot tiny home, meeting current building code and minimum dwelling parameters in Ontario.

This course runs as part of the Grand Studio Design Build program at the School of Architecture, which has dual focus of creating alternative housing in the Kitchener-Waterloo Region as well as cultural infrastructure projects in collaboration with local Indigenous communities. The program offers students the opportunity to carry through designs from preliminary research, to concept design, construction documents and the building of full-scale permanent structures, in collaboration with community groups, putting design education into practice, for architecture that can create tangible change for people in our surrounding local communities.

The studio will be supported by several expert contributors both regarding housing needs for vulnerable individuals, as well as professionals with expertise in high performance building design, providing the opportunity for students to learn *Passive House* level building envelope detailing, modular-construction and prefabrication techniques in contemporary housing solutions. Self-selecting teams within the studio will focus on different aspects of the research, design and construction of the tiny home including;

building structure, building envelope, building systems (plumbing and electrical) and building interior fixtures and finishes. Hands on experience with building and tools will be an asset, but is not required. Instruction for safe use of tools and building techniques will be provided, by studio instructors and workshop staff. Construction will primarily take place in the design build workspace outside the workshop, as well as in the shop, at the School of Architecture.

The studio begins with the Phase 1, the Research/Design/Detailing phase, starting with a look at dwelling spaces and the places in the Waterloo Region where provision of housing is currently being provided for housing insecure people. Phase 1 extends to the design of a dwelling space meeting the primary needs of shelter and a dignified place to live, building code and minimum dwelling standards. Optimization of the dwelling space, the materials used and the energy performance of the building, will inform creation of working drawings used for assembly/fabrication.

This is followed by the Phase 2 Fabrication/Construction/Documentation phase of the studio, which occupies the major part of the term. Concurrent with Phase 1 & Phase 2 will be the systematic documentation of the process, taking place throughout the term. This includes the production of a digital booklet chronicling the process from start to finish, as a portfolio take away for members of the class. Funding for the project is provided jointly by the Region of Waterloo and the University of Waterloo as part of the larger *Tiny Homes Research Project*, jointly led by Waterloo Architecture faculty members Professors Adrian Blackwell and John McMinn, together with School of Planning Professor Martine August.

COURSE REQUIREMENTS AND ASSESSMENT:

Students will be graded on the work performed during this course. Grading will be based on the degree to which submitted work satisfies the requirements and objectives of each assignment. In addition, grading will reflect student participation, commitment, effort and improvement over the 13 weeks of the course. The weighting of the projects throughout the term is as follows:

Phase 1 Research/Design/Detailing

P1 (0.5 wks) – Local Context Dwelling Study–due 9:00am on September 11 (5%)

P2 (0.5 wks) – Scale Shift Study–due 9:00am on October 14 (5%)

P3 (0.5 wks) – Illustrating a Lived-in Space–due 9:00am on October 18 (5%)

P4 (0.5 wks) – Tiny Home Design Charrette-due 5:30pm September 18 (5%)

P5 (3.0 wks) – Construction Documents-due: Pt A 1:30pm October 2 (10%), Pt B 1:30pm October 19 (10%)

Phase 2 Fabrication/Construction/Documentation

P6 (7.5 wks) - Building Construction-due 5:30 pm November 20 (50%)

P7 (9 wks/final 2 weeks) - Documentation + As-built Drawings-due 9:00 am December 4 (10%)

Total 100%

The specific deliverables and basis for the evaluation of each project will be identified in individual project handouts. Grades will be posted on LEARN after the deadline/review. Attendance at all lectures, all pinups (even if you are not presenting that week) and all reviews is required.

DESCRIPTION OF COURSE PROJECTS:

The studio will incorporate discussion of the existing research work from the Tiny Homes Cambridge research project, in order to address some of the following questions (those that are relevant) to prep for extending current research into the prototyping phase:

- What specific variables need to be tested through prototyping?
- What new information is needed to design a better prototype?

For the various projects in the term the studio will be divided into teams, with each team researching a specific aspect of local context dwelling, understanding locations of alternative housing, types of dwellings, unique characteristics of micro-housing, construction assembly options, and the potential for aggregate dwelling clusters, including collective service infrastructure. The initial research will be followed by development of a prototype design, construction documents, the fabrication and assembly of a full scale prototype, and documentation of the process and the completed building.

Advantages of micro-housing: Disadvantages of micro-housing:

- 1 Agency / Flexibility / Lack of space
- 2 Mobility / Low density for urban sites
- 3 Sustainability, examining envelope to volume ratio re energy and cost inefficiency
- 4 Potential for aggregation / Untested social arrangements

P1 Local Context Dwelling Study-due 9:00am on September 11

The first day of studio begins with the studio intro and P1 handout – P1 involves investigation and understanding the local geographic and personal contexts of tiny home and other alternative housing modes in the Waterloo Regio.

- Location of communities relative to social services
- Site planning and programming of these communities
- Construction, building assembly and energy performance

P2 Scale Shift Study- –due 9:00am on October 14

Scale shift involves comparative drawing analysis of spaces of your own dwelling and existing tiny home projects, to develop spatial awareness of micro-housing, in relation to familiar spaces of your own

P3 Illustrating a Lived-in Space-due 9:00am on October 18

Building on the awareness of spatial scale of micro-housing, \you are tasked with Illustrating a lived in space, using alternative means of representation of your choosing, reflecting the haptic qualities of lived in space and its difference, to the ways of experiencing spaces through normative architectural representation.

P4 Tiny Home Design Charrette-due 5:30pm September 18

The design charrette will involve groups of students working together in class developing alternative design solutions to meet different user needs and requirements in a variety of site contexts.

P5 Micro-housing Research and Design Development, creating Construction Documents

Part A-due 1:30pm October 2 Part B-due 1:30pm October 19 Preliminary concept design ideas developed in the Design Charrette will be reframed within clearly defined parameters, linked to the construction of a single prototype microhome. Teams will work on elements of the overall building assembly and interior fitments, producing packages of design and construction documents, through a BIM model of the building. Each of these packages requires design and research, to specify products incorporated into the assembly package.

Design and Research Development Teams

- 1) SIP panels building enclosure full class
- 2) exterior building envelope, including door/windows ~ 4 students
- 3) building systems including heating/cooling/ventilation, plumbing and electrical—~4 students
- 4) interior finishes fitments including, interior walls, floors, ceiling, trim detailing, lighting valences & coordination with groups 3 & 5 4 students
- 5) built in cabinetry and furniture $^{\sim}$ 4 students

P6 Construction of the Tiny Home prototype—due 9:00am on November 20 (with contingency time if needed). Alongside this building and in-situ design work, there will be some part-day building training sessions, in which instruction will be given on specific aspects of the material assembly elements and process.

The construction process will run over 7.5 weeks. Task groups teams determined in the design phase will be responsible for different aspects of the construction. Construction will run 9-6pm on Studio days, with studio faculty present for each building day.

Between studio construction days, each group will be tasked to analyze the work they have completed during that construction work-day and make a plan for what is to be done the next construction work-day. This plan needs to be submitted to the studio faculty next construction work-day for review and comment by the instructors.

P7 (final 2.5 wks) – Documentation will run through the construction phase, and Clean-up and consolidation of project site and storage areas –due 6:00pm on December 9 (15%)
The final project of the term involves the cleaning of the build site and consolidation of research, (and a degree of contingency time if needed for completion of the design documents and the construction) for presentation to the Region of Waterloo and external reviewers. Documentation will also involve the creation of a Studio book illiustrating the design and building process and the completed building.

LEARNING OBJECTIVES:

In relation to CACB accreditation requirements, the studio will cover the following criteria / requirements for Student Performance Criteria:

- A1: Design Theories, Precedents and Methods
- A2: Design Skills
- A3: Design Tools
- A5: Site Context and Design
- A8: Design Documentation
- B1: Critical Thinking and Communication
- B2: Architectural History
- B5: Ecological Systems
- C2: Materials
- C5: Environmental Systems

For Program Performance Criteria:

PPC2: Design Education

PPC3: Global Perspectives and Environmental Stewardship

PPC4: Collaboration, Leadership and Community

PPC5: Technical Knowledge PPC6: Breadth of Education

By the end of the course, students should be able to:

- to pursue independent research
- translate research into spatial understandings and present in a clear and graphically compelling way
- to work through a range of representation modes
- to learn basic skills in contemporary residential construction.

SCHEDULE:

Team meetings at start of each studio day as needed according to the phase of the studio being undertaken.

REFERENCES

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Simpson, Scott, Book of Framing: An Illustrated Guide for Residential Construction, Wiley, 2019.

LEARN – Official communication, syllabi, assignments, work submission, and grade recording and release. MS TEAMS – Virtual Hub for the course. Used for organizing course documents, activities and discussions. Students will be added to the course team in the first week of class. Class-wide virtual meetings will also be on TEAMS.

MIRO - for pining up both progress and for reviews.

In-person Activities Planning

This is a design-build studio and it will exclusively be held in person.

If course activities are impacted by a change in restrictions to in-person activities, such as changes in room occupancy limits, the instructor will communicate updated in-person activity plans. These plans may alter student plans for in-person activities.

LATE WORK

Assignments that are handed in late will receive an initial penalty of 5% on the first calendar day late and a 5% penalty per calendar day thereafter. After 5 calendar days, the assignment will receive a 0%. Only in the case of a justified medical or personal reason will these penalties be waived, and only if these have been officially submitted to the Undergraduate Student Services Co-Ordinator and accepted by the Undergraduate Office.

LATE PASS

Students are allocated one late pass for the term. This allows students to make one submission up to 72 hours after the stated deadline without penalty and without any request for accommodation. Students are required to communicate with your instructor their intention to use a late pass before the relevant deadline.

PASSING GRADES

The minimum passing grade in all studio courses is 60%. Grades below the specified passing grade result in a course failure.

Mental Health Support

All of us need a support system. We encourage you to seek out mental health supports when they are needed.

Please reach out to Campus Wellness (https://uwaterloo.ca/campus-wellness/) and Counselling Services (https://uwaterloo.ca/campus-wellness/counselling-services).

We understand that these circumstances can be troubling, and you may need to speak with someone for emotional support. Good2Talk (https://good2talk.ca/) is a post-secondary student helpline based in Ontario, that is available to all students.

Equity, Diversity And Inclusion Commitment

The School of Architecture is committed to foster and support equity, diversity and inclusion. If you experience discrimination, micro-aggression, or other forms of racism, sexism, discrimination against 2SLGBTQ+, or disability, there are several pathways available for addressing this:

- A) If you feel comfortable bringing this up directly with the faculty, staff or student who has said or done something offensive, we invite you, or a friend, to speak directly with this person. People make mistakes and dealing them directly in the present may be the most effective means of addressing the issue.
- B) you can reach out to either the Undergraduate office, Graduate office, or Director (Anne Bordeleau). If you contact any of these people in confidence, they are bound to preserve your anonymity and follow up on your report.
- C) You can choose to report centrally to the Equity Office. The Equity Office can be reached by emailing equity@uwaterloo.ca. More information on the functions and services of the equity office can be found here:

https://uwaterloo.ca/human-rights-equity-inclusion/about/equity-office.

D) Racial Advocacy for Inclusion, Solidarity and Equity (RAISE) is a student-led Waterloo Undergraduate Student Association (WUSA) service launching in the Winter 2019 term. RAISE serves to address racism and xenophobia on the University of Waterloo campus with initiatives reflective of RAISE's three pillars of Education and Advocacy, Peer-to-Peer Support, and Community Building. The initiatives include but are not limited to: formal means to report and confront racism, accessible and considerate peer-support, and organization of social events to cultivate both an uplifting and united community. You can report an incident using their online form.

Academic integrity, grievance, discipline, appeals and note for students with disabilities:

Academic integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check the Office of Academic Integrity for more information.]

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4. When in doubt, please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing an academic offence, and to take responsibility for his/her actions. [Check the Office of Academic Integrity for more information. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration, should seek guidance from the course instructor, academic advisor, or the undergraduate associate dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline. For typical penalties, check Guidelines for the Assessment of Penalties.

Appeals: A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes they have a ground for an appeal should refer to Policy 72, Student Appeals.

Note for students with disabilities: AccessAbility Services, located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with

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disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term.

Turnitin.com: Text matching software (Turnitin.) may be used to screen assignments in this course. Turnitin. is used to verify that all materials and sources in assignments are documented. Students' submissions are stored on a U.S. server, therefore students must be given an alternative (e.g., scaffolded assignment or annotated bibliography), if they are concerned about their privacy and/or security. Students will be given due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin in this course. It is the responsibility of the student to notify the instructor if they, in the first week of term or at the time assignment details are provided, wish to submit the alternate assignment