



<b>Course Number</b>	ARCH 702	<b>Classroom</b>	CBDL
<b>Course Name</b>	Studio 06 {Re} distributed Machines		
<b>Pre/Co-Requisites</b>			
<b>Instructor</b>	Dr Alicia Nahmad	<b>Office Hours/Location</b>	By appointment
	<b>Email:</b>	<b>Phone:</b>	
<b>Class Dates</b>	Real – time physical classes (depending on university regulations) From January 10 to April 14 2022 <b>Tuesdays and Fridays, 14:00-18:00 hrs (Meeting days)</b> [also Monday for specific software tutorials – MAYA elective]		
<b>Instructor Email Policy</b>	Course communications must occur through your @ucalgary email, and I will respond to emails sent via student’s @ucalgary emails within 48 hours. Additionally, communication and sharing platforms will be available for instant communication during the duration of the course.		
<b>Name and Email of Teaching Assistant(s)</b>	N/A.		

## Course Description

*(Include a description of the focus of the course, a broad overview of the key course content and an overview of the teaching approaches and methods. Also include link to Calendar description, e.g. <https://www.ucalgary.ca/pubs/calendar/current/architectural-studies.html#38564>)*

### Studio 06

#### RE-DISTRIBUTED MACHINES

The studio will use the mediums of architectural geometry and digital fabrication to propose architecture in a speculative economy, creating new, augmented and sustainable models for people to live, work and play together. Architecture and its production will be considered part of a larger ecological system that enables mass customization and distributed decision-making whilst optimizing resource utilization. The studio will address the design of various building typologies that characterize and shape social growth around them. At the core of the exploration lies the concept of participatory, democratized digital design and fabrication. RE-distributed machines will explore architectural geometries based on distributed digital production —the maturing technologies of robotic and digital manufacturing with their material conserving, ecologically, and structurally effective credentials are at the core of the design explorations.

Students will develop a kit of parts that responds to the social requirements of their program. The kit of parts will be reconfigurable and based on specific material and digital fabrication technologies that enable continuous customisation. Students will also design the factory required to produce the said kit of parts.

The studio tasks can be described as 1) assessment of resources and needs; 2) design a kit of parts based on principles of architectural geometry, material and digital fabrication (design language); 3) Design the fabrication logistic and sequences; 4) develop a model for negotiated growth. The tasks will be developed exploring new modes of cyber-physical architecture, participatory resource allocation, that imagine positive use scenarios and a bright future for our built environments.

Students during the term will focus on engaging with mature digital fabrication technologies such as digital timber, robotic hot-wire cutting, abrasive wire cutting and 3D printing in clay and plastic as the basis to build upon and develop their projects. The short duration of the studio -3.5months- is a factor to avoid engaging with the complexities of material experimentation and directing the time and resources towards the study of spatial configurations, architectural geometry and the micro-fabrication facilities with its machines and sequences of operations.

Studio deliverables and aims include developing a specific occupancy program, spatial configuration, construction kit of parts and the micro-factory that produces them, involving factory layout, machine inventory, sequencing of processes and final output.

**CURRENT SOCIAL AND TECHNOLOGICAL CONDITION:** Does every building really tell a story? Once upon a time, a home might have been built of the very stuff on which it stood, stones and timbers scarred by the simple tools that shaped them, like the handprints of the potter clinging to a clay vessel—worked and reworked by successive generations of occupants, with the support of the wider community ... In comparison to its older kin, most housing built since the Second World War appears two-dimensional, stripped of narrative. Why is this?

Prefabricates have taken a position as an efficient off-site, quantifiable, machinic alternative to traditional construction methods. However, they result in centralized models of architectural production. 87.5% of building sites are not accessible to prefabricates amongst other things due to the non-standard site condition, being on a remote location or in a central place in which machines will be incredibly disruptive. Additionally, costs of transportation and specific design requirements need to be analyzed. The lack of skills increased by a situation like the COVID-19 pandemic invites us to question: how are the spaces created by these 'construction factories' better than spaces from previous centuries. Moreover, how can we design for manufacturing optimizing machine and resource utilization to design an architecture in which ***form follows resource availability***.

Robotic fabrication and industrialized construction for resource-effective physical realization of the built environment are the more efficient solution for a construction industry, one of the least productive, more polluting industries.

COVID has changed the meaning and use of spaces, houses that were mainly used as sleeping quarters are now offices, party places and social spaces that host all our professional and social activities. New material and construction technologies are pushing governments to adopt dynamic building codes, similar to how software developers reuse reliable proven software, cities could be build using 'pre-approved' modules (CLT, stackable modular housing, 3D printing) . The US is planning to introduce them by 2023

Innovative opportunity funds are being established as replacements for the mortgage system of buying a house. New ownership methods that spur the adoption of innovation in construction, materials and products. Systems that also account for the less tangible amenities of the house that are valued by occupants.

The studio foresees architectural solutions that {RE}distribute and democratize digital design and digital fabrication. It proposes to investigating how the added degrees of freedom enabled by digital fabrication can result in more fluid creations that blend modes of use and user experiences for the same space. Through the use of architectural geometry, shape design and emerging fabrication technologies, the studio expects the creation of physically realizable, ecologically sound, structurally effective assets that shape the built environment.

**The {RE}Distributed Design Incubator Will Be Located In ....**

- 1.The city of Calgary and its proposal for an innovation district**
- 2.Remote locations that have the natural resources and that would benefit from avibrant community and its corresponding architecture.**

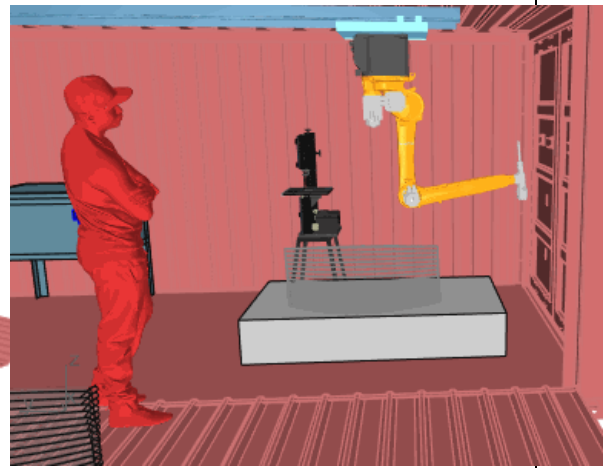
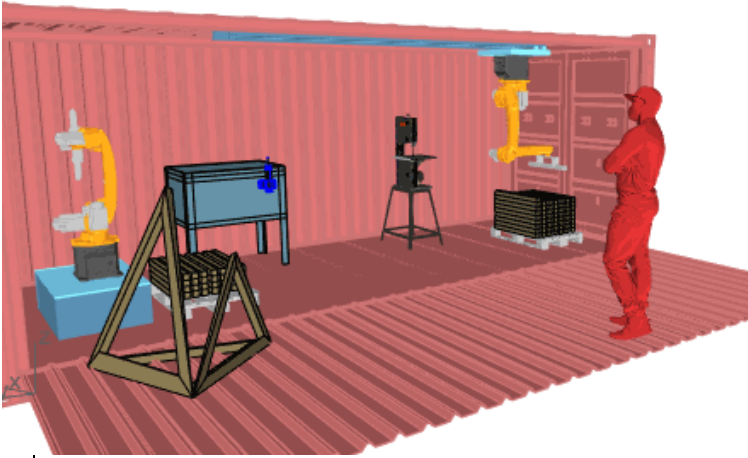
**You Bring Machines....**

**You Create The Rules .....**

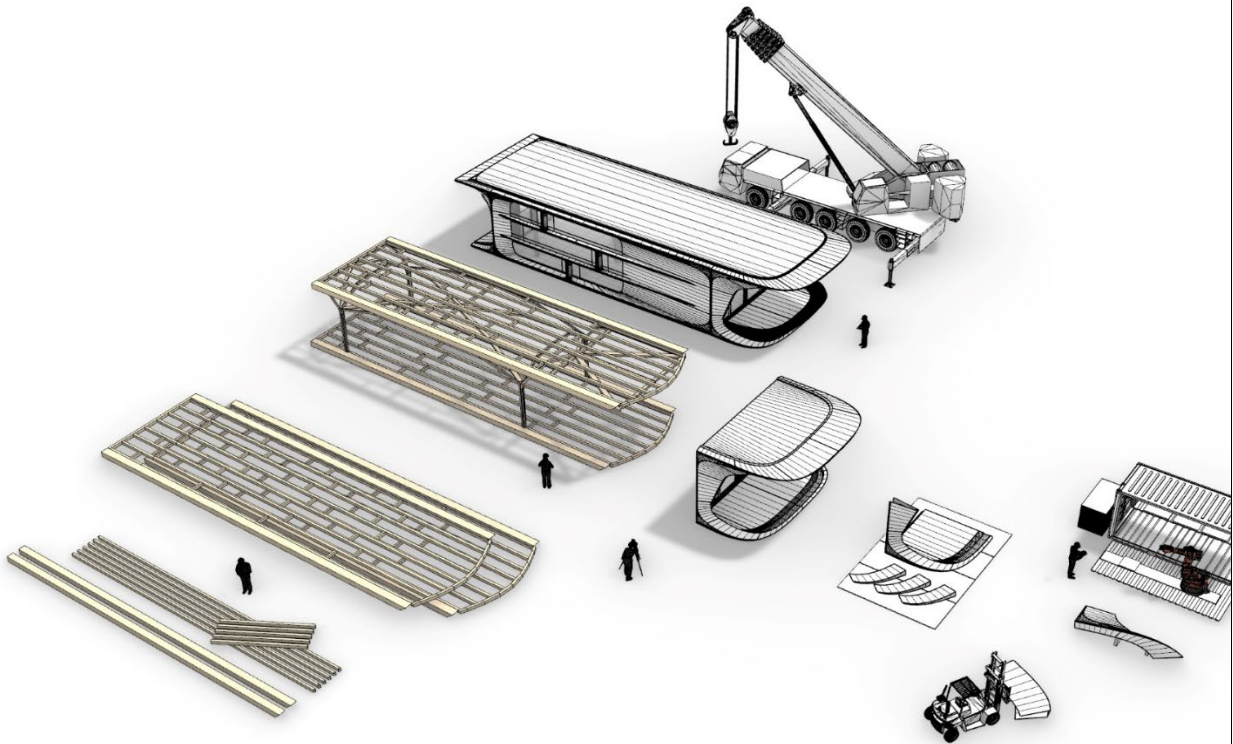
**You Design The System.....**



Beyabu by Zaha Hadid Architects, Prospera



Multiple fabrication and architectural possibilities enabled by digital fabrication machines



Combinatorial kit of parts means, modular-bespoke, means rule-based combination and recombination etc.

Image by Zaha Hadid Architects, Prospera



Participatory, democratized modes of production.

Source: Commonhood <https://www.plethora-project.com/commonhood>

**Course Hours:** e.g. 3 units; (2-1Tutorial)

## Online Delivery (If applicable)

Include a statement related to how learning will occur in both synchronous (i.e., real-time/Zoom) and asynchronous (i.e., students complete on their own time such as discussion boards, watching videos, etc.) contexts. Ensure that the dates and times for all synchronous sessions are indicated clearly in the course outline. All synchronous sessions must be scheduled during the dates and times already timetabled for this course.

The course will be delivered in real life. Studio meeting days are expected to be in person unless the university indicates otherwise. In case classes return to an online/ hybrid format the course would then be delivered using resources such a zoom, until the university deems safe to return to in person meetings.

Students are expected to follow all assignments, to be fully present for studio on Tuesdays and Fridays (and as otherwise required by the instructor/schedule) and attend all lectures and reviews.

Students will also be expected to read any assigned readings. Detailed project descriptions will be provided throughout the term.

Online resources such as Miro and collaborative platforms will be used to share information and resources in real time, students are expected to participate and engage in them, share material and progress.

## Course Learning Outcomes

Upon completion of this course, students will know and be able to:

1. To develop critical design thinking and design skills through the design of a mid-sized project, based on a critical understanding of the material, digital fabrication systems and machines with the opportunities and complexities that they afford to designers and contemporary architectural language
2. Understand the complexities of a site, its opportunities and develop an architectural program based on the site opportunities and constraints.
3. To develop skills and awareness of urban contexts through research, analysis, and interpretation, leading to an appropriate architectural project.
4. Understand digital design and fabrication processes for the innovation that they offer and design and deploy a kit of parts that takes advantage of them whilst offering novel spatial experiences.
5. Develop site design, graphic, concept design, design development and construction skills.

**Learning Resources** Include any required textbooks and/or readings. Specify if a link to any required textbooks and/or readings will be provided in the course D2L site. Review copyright information for all resources included (see <https://library.ucalgary.ca/copyright> ) and ensure all readings and other electronic resources have been reviewed for copyright compliance by contacting [copyright@ucalgary.ca](mailto:copyright@ucalgary.ca) prior to the start of term.

Required readings, textbooks and learning materials:

Readings and links will be provided to students through the course by the instructor on the course handout.

Suggested book:

Last Futures: Nature, Technology and the End of Architecture by Douglas Murphy. Verso 2016

**Technology requirements (D2L etc.):** Technology requirements (D2L etc.):

In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Broadband internet connection

Most current laptops will have a built-in webcam, speaker and microphone.

### **Workshop Safety Training Requirement**

If a course requires the use of the SAPL workshop, students must complete all online University of Calgary safety courses, the online Trajectory safety training course, as well as in-person workshop training and a grade of pass on the final evaluation project, to be granted access to the SAPL workshop. This training is offered once a year, around the start of the Fall term and has a completion deadline.

## **Additional Classroom Conduct and Related Information**

### **Guidelines for Zoom Sessions in Online Classes**

Students are expected to participate actively in all Zoom sessions and to turn on their webcam. Please join our class in a quiet space that will allow you to be fully present and engaged in the Zoom sessions. Students must behave in a professional manner during the session. Students, employees, and academic staff are also expected to demonstrate behaviour in class that promotes and maintains a positive and productive learning environment.

## **Assessment Components**

<b>Assessment Method</b>	<b>Description</b>	<b>Weight</b>	<b>Aligned Course Learning Outcome</b>
Phase 1	Resource analysis and program definition, fabrication & material precedent research	20%	1 to 5
Phase 2	Industrialized construction (hierarchical production organization, off-the-shelf vs customized), machinic setup and digital fabrication	30%	1 to 5

	workshop setup, production sequences)		
Phase 3	Architectural geometry and kit of parts ( development of an architecture and tectonic language that responds to the material and fabrication system whilst providing novel spatial experiences)	35%	1 to 5
Phase 4	Final portfolio and physical prototype (1:5) of a project detail	15%	5

## Assessment and Evaluation Information

Students will be expected to follow all assignments, to be present for studio on Tuesdays and Fridays (and as otherwise required by the instructor/schedule) and attend all lectures and reviews.

Students will also be expected to read any assigned readings.

Detailed project descriptions will be provided throughout the term.

Guidelines for Submitting Assignments:

### Final Examinations:

Will consist of the project presentation, including a printed A1 poster, 1:5 fabrication prototype and book content

**Expectations for Writing** (<https://www.ucalgary.ca/pubs/calendar/current/e-2.html>):

Criteria that must be met to pass: (e.g. whether a passing grade on any particular component of a course is essential if the student is to pass the course as a whole; information on what students should do if they miss a required component of the course, etc.)

## Grading Scale

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	

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.

The School of Architecture, Planning and Landscape will not permit the Flexible Grade Option (CG Grade) for any course offered by the School. (<https://www.ucalgary.ca/pubs/calendar/current/salp-3-3.html>)

## (for Architecture courses only) CACB Student Performance Criteria

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

Primary Level: A1: Design Theories, Precedents, and Methods; A2: Design Skills; A3: Design Tools; A5: Site Context and Design; A8: Design Documentation

Secondary Level: A4: Program Analysis; A6: Urban Design; B1: Critical Thinking and Communication; B5: Ecological Systems; C2: Materials; C3: Structural Systems

## Topic Areas & Detailed Class Schedule

*Include information relevant to the class schedule, such as weekly topics, readings, and assignment due dates. For online, remote or blended courses include whether course activities are synchronous (i.e., real-time/Zoom) and asynchronous (i.e., students complete on their own time such as discussion boards, watching videos, etc.). It is recommended that important dates including the first day of classes, holidays, term breaks and last day of classes also be included.*

Course Schedule Date	Topic	Assignments/Due Dates
<i>Examples below, please adjust to fit your course dates.</i>		
Jan 9 – 13		
Jan 16 - 20		
Jan 27	Resource analysis and program definition, fabrication &	10%

	material precedent research. (group)  Geometry Studies	10%
Jan 30 – Feb 3		
Feb 6 - 10		
Feb 13 – 17 Friday Feb 17	<b>Midterm presentation</b>	30%
Feb 19 -25	Term Break	
Monday Feb 20	Alberta Family Day Holiday	
Feb 27 – Mar 3		
Mar 6 - 10		
Mar 13 - 17	Winter Block Week	
Mar 20 - 24		
Mar 27 – 31		
Apr 3 – 6 April 06	Architectural Geometry and Kit of Parts including fabrication logics informing the material, dimension, and structural logics	20%
Friday April 7	Good Friday	
Monday April 10	Easter Monday	
Apr 11 – 12 <b>Tuesday 18<sup>th</sup> of April</b>	<b>Final Review</b>	40%
Indicate the following dates: <ul style="list-style-type: none"> <li>If applicable, dates, times and locations of all approved class activities scheduled outside of regular course hours</li> </ul>		

## Guidelines for Zoom Sessions

*If video conferencing tools such as Zoom or MS Teams will be used during course activities, provide information related to student learning and conduct, and indicate whether these sessions will be recorded.*

N/A unless indicated by the university due to a change to online teaching.

Zoom is a video conferencing program that will allow us to meet at specific times for a “live” video conference, so that we can have the opportunity to meet each other virtually and discuss relevant course topics as a learning community.

To help ensure Zoom sessions are private, do not share the Zoom link or password with others, or on any social media platforms. Zoom links and passwords are only intended for students registered in the course. Zoom recordings and materials presented in Zoom, including any teaching materials, must not be shared, distributed or published without the instructor’s permission.

The use of video conferencing programs relies on participants to act ethically, honestly and with integrity; and in accordance with the principles of fairness, good faith, and respect (as per the [Code of Conduct](#)). When entering Zoom or other video conferencing sessions (such as MS Teams), you play a role in helping create an effective, safe and respectful learning environment. Please be mindful of how your behaviour in these sessions may affect others. Participants are required to use names officially associated with their UCID (legal or preferred names listed in the Student Centre) when engaging in these activities.

Instructors/moderators can remove those whose names do not appear on class rosters. Non-compliance may be investigated under relevant University of Calgary conduct policies (e.g. [Student Non-Academic Misconduct Policy](#)). If participants have difficulties complying with this requirement, they should email the instructor of the class explaining why, so the instructor may consider whether to grant an exception, and on what terms. For more information on how to get the most out of your zoom sessions visit:

<https://elearn.ucalgary.ca/guidelines-for-zoom/>

If you are unable to attend a Zoom session, please contact your instructor in advance to arrange an alternative activity for the missed session (e.g., to review the recorded session). Please be prepared, as best as you are able, to join class in a quiet space that will allow you to be fully present and engaged in Zoom sessions. Students will be advised by their instructor when they are expected to turn on their webcam (for group work, presentations, etc.).

The instructor may record online Zoom class sessions for the purposes of supporting student learning in this class – such as making the recording available for review of the session or for students who miss a session. Students will be advised before the instructor initiates a recording of a Zoom session. These recordings will be used to support student learning only and will not be shared or used for any other purpose.

## Special Budgetary Requirements

Special budgetary requirements are limited to the optional purchase of course readings and, in specific courses, mandatory supplementary fees to cover certain expenditures, such as field trips. Mandatory supplementary fees must be approved by the University prior to implementation. Instructors are required to list and describe approved optional and mandatory supplementary fees for courses. This can include possible costs incurred for special materials, equipment, services, or travel.

## University of Calgary Policies and Supports

**COVID-19 PROCEDURE FOR SICK STUDENTS:** <https://www.ucalgary.ca/risk/covid-19-procedure-for-sick-students>

**UNIVERSITY OF CALGARY COVID-19 UPDATES:** <https://www.ucalgary.ca/risk/emergency-management/covid-19-response>

## **ACADEMIC ACCOMMODATION**

It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The student accommodation policy can be found at: <https://www.ucalgary.ca/legal-services/university-policies-procedures/student-accommodation-policy>

Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: <https://www.ucalgary.ca/legal-services/university-policies-procedures/accommodation-students-disabilities-procedure>

Students needing 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 (contact information on first page above).

SAS will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students with disabilities, visit [www.ucalgary.ca/access/](http://www.ucalgary.ca/access/).

## **ACADEMIC MISCONDUCT**

Academic Misconduct refers to student behavior which compromises proper assessment of a student's academic activities and includes: cheating; fabrication; falsification; plagiarism; unauthorized assistance; failure to comply with an instructor's expectations regarding conduct required of students completing academic assessments in their courses; and failure to comply with exam regulations applied by the Registrar.

For information on the Student Academic Misconduct Policy and Procedure please visit:

<https://ucalgary.ca/policies/files/policies/student-academic-misconduct-policy.pdf>  
<https://ucalgary.ca/policies/files/policies/student-academic-misconduct-procedure.pdf>

Additional information is available on the Academic Integrity Website

at <https://ucalgary.ca/student-services/student-success/learning/academic-integrity>.

## **COPYRIGHT LEGISLATION:**

All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright ([www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf](http://www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf)) and requirements of the copyright act (<https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html>) to ensure they are aware of the consequences of unauthorised sharing of course materials (including instructor notes, electronic versions of textbooks etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy (<https://www.ucalgary.ca/pubs/calendar/current/k.html>).

## **INSTRUCTOR INTELLECTUAL PROPERTY**

Course materials created by instructors (including presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the instructor. These materials may NOT be reproduced, redistributed or copied without the explicit consent of the instructor. The posting of course materials to third party websites such as

note-sharing sites without permission is prohibited. Sharing of extracts of these course materials with other students enrolled in the course at the same time may be allowed under fair dealing.

### **FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY**

Student information will be collected in accordance with typical (or usual) classroom practice. Students' assignments will be accessible only by the authorized course faculty. Private information related to the individual student is treated with the utmost regard by the faculty at the University of Calgary.

### **SEXUAL VIOLENCE POLICY**

The University recognizes that all members of the University Community should be able to learn, work, teach and live in an environment where they are free from harassment, discrimination, and violence. The University of Calgary's sexual violence policy guides us in how we respond to incidents of sexual violence, including supports available to those who have experienced or witnessed sexual violence, or those who are alleged to have committed sexual violence. It provides clear response procedures and timelines, defines complex concepts, and addresses incidents that occur off-campus in certain circumstances. Please see the policy available at <https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>

**UNIVERSITY STUDENT APPEALS OFFICE:** If a student has a concern about a grade that they have received, they should refer to Section I of the Undergraduate Calendar (<https://www.ucalgary.ca/pubs/calendar/current/i-3.html>) which describes how to have a grade reappraised. In addition, the student should refer to the SAPL's Procedure for reappraisal of grades

### **OTHER IMPORTANT INFORMATION**

Please visit the Registrar's website at:

<https://www.ucalgary.ca/registrar/registration/course-outlines> for additional important information on the following:

- Wellness and Mental Health Resources
- Student Success
- Student Ombuds Office
- Student Union (SU) Information
- Graduate Students' Association (GSA) Information
- Emergency Evacuation/Assembly Points
- Safewalk