INTEG 121 — Collaboration, Design Thinking, and Problem Solving
(held with INDEV 212 — Problem-solving for Development[1])

Course Description: A project course in design and problem solving across various disciplines. Topics include problem-solving methods and issues in design, including ethics, sustainability, and collaboration in small groups. Applied design projects require group work and draw on the skills of creative and critical thinking.[2]

Course Objectives: Design is more than making *things*, or making things *pretty*; design is about making things *better*. This course introduces design thinking as a universal Knowledge Integration skill for solving complex problems. Collaboration and design thinking are exercised and studied through a series of group-based, real-world projects, culminating in an open-ended design challenge and project portfolio.

By the end of this course, you should be able to:
1) Record and share detailed observations of the world around you in order to think critically and analytically to identify what works well and what could be improved upon;
2) Take initiative, exercise responsibility, problem solve, and make decisions during crucial stages of a design cycle including
   ○ Identifying and honoring *de facto* and required constraints,
   ○ Exercising critical thinking to identify criteria for the effectiveness of a proposed design,
   ○ Understanding when it is most appropriate to engage in divergent *versus* convergent thinking,
   ○ Making informed choices from a variety of alternatives, and
   ○ Evaluating results of your own work and that of others.
3) Exercise skills in active listening and teamwork to collaborate well in groups in order to develop and take best advantage of a diversity of skills while taking into account other individuals' skills and interests; and
4) Complete a challenging series of projects to your own and your group's satisfaction.
5) Be able to articulate your experience and skills in the above areas.

Meeting time and place: Monday and Wednesday, 10:30 AM - 12:20 PM, EV2-2069
Instructor: Dr. Vanessa Schweizer, vanessa.schweizer@uwaterloo.ca
Design Demonstrator: Mr. Paul McKone, pdmckone@uwaterloo.ca
Teaching Assistant: Blessing Ajayi, blessing.ajayi@uwaterloo.ca
Office Hours (with Dr. Schweizer)**:** Mondays 3:00 PM – 3:50 PM in EV1-211

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[1]Course description: Students will obtain an understanding of the fundamental features of creative thinking, decision-making and problem-solving from both a descriptive and a normative point of view. Techniques for analyzing problem-solving and decision-making by individuals and groups with particular attention to the impact of cultural difference among individuals and within teams. Techniques for improving problem-solving and decision-making in a community development context will be considered. Effective negotiation in different cultural contexts will be studied.
[2] Note: Estimated additional cost to student: $30.

Required Texts and Materials:
- *Change by Design: Revised and Updated*, Tim Brown, ISBN 978-0-06-285662-3
  - The previous edition is also acceptable: *Change by Design,* ISBN 978-0-06-176608-4
- *Lean Impact*, Ann Mei Chang, ISBN 978-1-119-50660-7
- *Design: Creation of artifacts in society,* Karl T. Ulrich (available at http://opim.wharton.upenn.edu/~ulrich/designbook.html)
- Small pack of **white** notecards (3x5 or 4x6)
- Easy-to-carry journal/sketchbook

Select chapters from the following books may be made available via LEARN:
- *Glimmer*, Warren Berger
- *Communicating in Small Groups,* Beebe and Masterson
- *Design: A Very Short Introduction,* John Heskett

Optional and recommended texts:
- *Communicating in Small Groups,* Beebe and Masterson, 2014
- *Universal Methods of Design,* Hanington and Martin, 2012
- *The Design of Everyday Things,* Donald Norman, 2002 or 2013

Course requirements and expectations:

Obj.	Deliverable	% Final Grade
	Observation and Participation	**20%**
1	• In-class observations (6)	(40%)
1	• Sketchbook checks (6)	(40%)
1,3	• In-class critique and charrette days (2)	(15%)
1.5	• Discussion board post (1)	(5%)
	Project 1: Public Service Announcement (PSA)	**13%***
1,2	• PSA individual case design analysis	(25% of project)
3,4	• PSA group project	(50% of project)
5	• PSA individual reflection	(25% of project)
	Project 2: Environments Design (ED)	**26%***
1,2	• ED individual case design analysis	(25% of project)
3,4	• ED group project	(50% of project)
5	• ED individual reflection	(25% of project)
	Project 3: Open Design Change (ODC)	**0%**
1,2	• ODC individual case design analysis	(25% of project)
3,4	• ODC group project	(40% of project)
5	• ODC individual reflection	(35% of project)
1,4-5	**Final ePortfolio**	**41%**

*At the end of term, the lowest mark for all of Project 1 can be replaced with a higher mark earned on a later project.
(Note: Assignments reflect 20.5% group work, 81.5% individual work)

Observation and participation: To become a design thinker, *active* participation is required. This mark will be affected by how well you participate in and prepare for assigned and classroom activities, group work, and discussion. This includes regular in-class observations, check-ins on the contents of your sketchbook, participation with your project group, as well as in-class prototyping and small-group activities. The observation and participation mark will be determined by your attendance and the quality of your developing skills in observation and group problem-solving.

- **In-class observations:** On days where an in-class observation is assigned, please bring a blank notecard to class.
- **Sketchbook:** Each day that you are not assigned an in-class observation, you will record at least one observation in your sketchbook. Periodically during the term, your sketchbook will be collected to gauge participation and provide feedback on the quality of your observations.

Projects (balance of individual *vs.* group work): *Individual case studies* and *individual reflections* are to be prepared and submitted individually. We anticipate that students will discuss these with each other, and such discussion is beneficial, as it can improve your understanding and learning. However, students must still produce original work from individual effort, maintaining their academic integrity. Knowing how to balance discussion with others while avoiding copying and other academic offenses can seem tricky. Some suggestions:

- After you discuss a project or idea with a colleague, take a one-hour break to have dinner, watch TV, exercise – do whatever you like – before writing up the idea. This will mean that it comes out in your own words, and it will allow you to confirm that you have integrated it into your own thinking (acquired new knowledge) rather than just reproducing the discussion.
- **Do not** share electronic files of individual assignments with each other before an assignment due date.

Group projects are meant to be done in groups, and submitted as a single, consistent, coherent submission. The project should reflect the group as a whole, not just the monumental efforts of a few participants. **Note: if there are any concerns with the academic integrity of a group project, all group members will be considered responsible.** To ensure that a group project reflects the efforts of all group member, It will involve coordination and cooperation, and may involve diplomatically encouraging some group members to step up, and others to step back.

Final ePortfolio: As part of each project, you will write a personal reflection about your individual contributions. These will become part of a portfolio of reflections, prototypes, and artefacts produced for this course. In the ePortfolio assignment, you will review all of your efforts in order to reflect on the skills that you developed over the term.

Assignment submission and return:

- Assignments will be marked 'blind'. This means that marks will be recorded without knowing the identity of the student. To help us with this process, **please use only your SID and group number (e.g. PSA Group 1, ED Group 5, ODC Group 3)** to identify your assignment submission. A TA will put your name on the assignment after all assignments have been marked.

- Assignments are to be submitted by the start of class on the specified due date electronically, and marked assignments will be returned electronically. A separate handout will specify the platform to use (either LEARN or PebblePad) as well as the required file format (e.g., PDF). Please consult the handout.

- **Be sure to follow directions for assignment submission. If you do not, the mark on your assignment is subject to a 5% penalty** for not following directions. *This means that an assignment that presents work at the quality level of 85% can be knocked down to 80% for not following directions.* Any of the following errors will result in a penalty:
  - Failing to provide an electronic copy
  - Leaving identifying information on your assignment (e.g. name, SID)

LEARN: Users can login to LEARN via: http://learn.uwaterloo.ca/. Use your WatIAM/Quest username and password. Documentation is available: https://uwaterloo.ca/learn-help/students

PebblePad: Users can login to PebblePad via the link made available on LEARN. Documentation is available:
https://uwaterloo.teamdynamix.com/TDClient/1804/Portal/KB/?CategoryID=11605

Late submissions: Each student will be allocated a total of 4 grace days, which allow assignments to be handed in late without penalty. At the end of the term, the total number of late days (including weekends) will be counted, the 4 grace days will be subtracted, and you will receive a 1% penalty on your **overall** course grade for each late day beyond the grace days. For example, if the reflection for Project 1 is late by 3 days, and the case study for Project 3 is late by 4 days, you will receive a 3% late penalty on your final course grade at the end of the term. *NOTE: Bear in mind the 5% assignment penalty for submissions that do not follow directions.*

Unclaimed assignments: Unclaimed assignments will be retained until one month after term grades become official in Quest. After that time, they will be destroyed in compliance with UW's confidential shredding procedures.

University policies and services

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 (**www.uwaterloo.ca/academicintegrity/)**.
*Students who are unsure what constitutes an academic offence are requested to visit the on-line tutorial at **http://www.lib.uwaterloo.ca/ait/***

Disciplinary action, or consequences of academic offences:

A student is expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offense, or who needs help in learning how to avoid offenses (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. When misconduct has been found, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline, http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm. For typical penalties, check Guidelines for Assessment of Penalties, https://uwaterloo.ca/secretariat/guidelines/guidelines-assessment-penalties.

Within ENV, those committing academic offences (e.g. cheating, plagiarism) will be placed on disciplinary probation and will be subject to penalties that may include a grade of 0 on affected course elements, 0 on the course, suspension, and expulsion.

*<u>**Grievance:**</u> Students who believe that they have been wrongfully or unjustly penalized have the right to grieve; refer to Policy #70, Student Petitions and Grievances, Section 4, http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm. When in doubt, please contact your department's administrative assistant (e.g. Undergraduate Advisor) for further assistance.*

Appeals: A decision made or penalty imposed (other than a petition) under Policy 70 (Student Petitions and Grievances) or Policy 71 (Student Discipline) may be appealed if there is a ground. A student who believes s/he has a ground for an appeal should refer to Policy 72 (Student Appeals) **www.adm.uwaterloo.ca/infosec/Policies/policy72.htm**

Intellectual Property: Students should be aware that this course contains the intellectual property of their instructor and/or the University of Waterloo. Intellectual property includes items such as:
- Lecture content, spoken and written (and any audio/video recording thereof);
- Lecture handouts, presentations, and other materials prepared for the course (e.g., PowerPoint slides);
- Questions or solution sets from various types of assessments (e.g., assignments, quizzes, tests, final exams); and
- Work protected by copyright (e.g., any work authored by the instructor or TA or used by the instructor or TA with permission of the copyright owner).

Course materials and the intellectual property contained therein, are used to enhance a student's educational experience. However, sharing this intellectual property without the intellectual property owner's permission is a violation of intellectual property rights. For this reason, it is necessary to ask the instructor, TA and/or the University of Waterloo for permission before uploading and sharing the intellectual property of others online (e.g., to an online repository).

Permission from an instructor or the University is also necessary before sharing the intellectual property of others from completed courses with students taking the same/similar courses in subsequent terms/years. In many cases, instructors might be happy to allow distribution of certain materials. However, doing so without expressed permission is considered a violation of intellectual property rights.

Please alert the instructor if you become aware of intellectual property belonging to others (past or present) circulating, either through the student body or online. The intellectual property rights owner deserves to know (and may have already given their consent).

Research ethics: Please also note that the 'University of Waterloo requires all research conducted by its students, staff, and faculty which involves humans as participants to undergo prior ethics review and clearance through the Director, Office of Human Research and Animal Care (Office). Class readings may make references to 'user research'. As will be discussed, such activities are recognized at the University of Waterloo as <u>entrepreneurial activities</u> (see **https://uwaterloo.ca/research/office-research-ethics/research-human-participants/pre-submission-and-training/human-research-guidelines-and-policies-alphabetical-list/definition-professional-skill-development-0**). Entrepreneurial activities do not require research ethics clearance. For other research activities that are not entrepreneurial (e.g. resulting in a thesis), the ethics review and clearance processes are intended to ensure that projects comply with the Office's Guidelines for Research with Human Participants (Guidelines) as well as those of provincial and federal agencies, and that the safety, rights and welfare of participants are adequately protected. The Guidelines inform researchers about ethical issues and procedures which are of concern when conducting research with humans (e.g. confidentiality, risks and benefits, informed consent process, etc.). If the development of your research proposal consists of research that involves humans as participants, the please contact the course instructor for guidance and see **http://iris.uwaterloo.ca/ethics/**

Note for students with disabilities: The AccessAbility Office located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. *If you require academic accommodations to lessen the impact of your disability, please register with the AccessAbility Office at the beginning of <u>each</u> academic term.*

Mental health: The University of Waterloo, the Faculty of Environment and our Departments consider students' wellbeing to be extremely important. We recognize that throughout the term students may face health challenges - physical and/or emotional. **Please note that help is**

available. Mental health is a serious issue for everyone and can affect your ability to do your best work. Counselling Services (**www.uwaterloo.ca/counselling-services**) is an inclusive, non-judgmental, and confidential space for anyone to seek support. They offer confidential counselling for a variety of areas including anxiety, stress management, depression, grief, substance use, sexuality, relationship issues, and much more.

The Writing and Communication Centre: The Writing and Communication Centre helps students clarify their ideas, develop their voices, and write in the style appropriate to their disciplines. Writing and Communication Centre staff offer one-on-one support in planning assignments and presentations, using and documenting research, organizing and structuring papers, and revising for clarity and coherence. You can make multiple appointments throughout the term, or drop in at the Library for quick questions or feedback. To book a 50-minute appointment and to see drop-in hours, visit https://uwaterloo.ca/writing-and-communication-centre/. Group appointments for team-based projects, presentations, and papers are also available. Please note that writing specialists guide you to see your work as readers would. They can teach you revising skills and strategies, but will not proof-read or edit for you. Please bring hard copies of your assignment instructions and any notes or drafts to your appointment.

Religious observances: Please inform the instructor at the beginning of term if special accommodation needs to be made for religious observances that are not otherwise accounted for in the scheduling of classes and assignments.

Tentative schedule of classes:

Date	Topic/Activity	Due this date (start of class)	*Assigned for homework*
WK 1: Jan 6 (M)	• Design thinking as KI and social innovation • Working with integrity • Getting the most out of LEARN	—	• *Brown: Intro, Ch. 1* • *Chang: Ch. 1*
Jan 8 (W)	• Observations 1: Getting started • Norman Principles of user-centred design • Prototyping 1: Bricolage	Sketchbook 1	• *Daily observations* • *TED talk re: sketching*
WK 2: Jan 13 (M)	• Discussion: Perspectives on design thinking • Public Service Ad (PSA) project launch and intro to effective ad design	• In-class observation 1 • Brown, Chang readings	*PSA project (case study)*
Jan 15 (W)	• Idea generation / prototyping 2: Brainstorming	Sketchbook 2	• *Brown: Ch. 2* • *Chang: Ch. 3*
WK 3: Jan 20 (M)	• PSA case study exchange • Project time (design brief, prototyping)	• In-class observation 2 • PSA case study	*PSA project (dossier)*
Jan 22 (W)	• Problem-solving: A skill employers want • Discussion: Insights from observation, empathy	• Sketchbook 3 • Brown, Chang readings	• *PSA project (reflection)* • *Brown: Ch. 3-4*
WK 4: Jan 27 (M)	PSA project display and critique	PSA project (dossier)	*(PSA reflection)*

Jan 29 (W)	• PSA project de-brief and portfolio thinking
	• Group dynamics 1
	   • Tuckman's model
	   • Delegation *vs.* collaboration
	   • Hirokawa & Pace's functional model
		• In-class observation 3
		• Sketchbook 4
			Ulrich: Ch. 3

Jan 31 (F)	PSA reflection due (electronic submission by 10:30 AM)		
WK 5: Feb 3 (M)	• Environments Design (ED) project launch • Basics of project and time management • Idea generation / prototyping 3: Mindmapping	Readings: Brown, Ulrich	*ED project* *(case study)*
Feb 5 (W)	• Observations 2: Behavioural & place-centred mapping • ED site visit	Sketchbook	*Brown: Ch. 5-6*
WK6: Feb 10 (M)	• ED case study exchange • Project time and Prototyping 4: Personas, role playing	• In-class observation 4 • ED case study	*(ED project dossier)*
Feb 12 (W)	• Prototyping 5: Scale models • Project time for scale models	—	*(ED project dossier)*
Feb 17-21	Family Day and Reading Week (no class meetings)	—	• *Brown: Ch. 8-9, 11* • *Chang: Ch. 5, 10*
WK 7: Feb 24 (M)	• Discussion: Designed experience & storytelling • ED project time	Reading: Brown Ch. 5-6	*(ED project dossier)*
Feb 26 (W)	ED project time	• In-class observation 5 • Sketchbook 5	*(ED project dossier)*

WK 8: March 2 (M)	ED project display and critique		ED project (dossier)	*(ED project reflection)*
March 4 (W)	• ED project debrief • Group dynamics 2: Group expectations, meetings, decision making • Open Design Challenge (ODC) project launch		ED project reflection	• *(Final portfolio)* • *Beebe & Masterson* • *ODC project (case study)*
WK 9: March 9 (M)	The Right Question Formulation Technique and ODC project time		• In-class observation 6 • Sketchbook 6	*ODC project (case study)*
March 11 (W)	• ODC case study exchange • ODC project time		• ODC case study	• *(ODC project)* • *(Reading Week chapters)*
WK10: March 16-18	Instruction activities suspended (as indicated by the University President)			
WK 11: March 23 (M)	• **Synchronous** discussion, Q&A of final changes to course • **Asynchronous** post to discussion board: Perspectives on systems, sustainability, ethics; design activism • **Slides available** for Prototyping 6+: Prototyping with paper		Discussion board post re: Reading Week chapters (due 11:59 PM local time)	—
March 25 (W)	**Synchronous** overview and Q&A of ePortfolio assignment		—	*ePortfolio*
WK 12: March 30 (M)	• **Slides available** for "Design Tomorrow Today" • Course evaluation		Opens: Anonymous LEARN dropbox for course feedback	*(ePortfolio)*
Apr 1 (W)	Extra 'office hours' during regularly scheduled course time (in Virtual Classroom)		—	*(ePortfolio)*

Apr 7 (T)	Course evaluations in eValuate and anonymous LEARN dropbox close 11:59 PM <u>Eastern Time</u>		
'FINAL' Apr 15 (W)	ePortfolio, including self-reflective essay	ePortfolio (due 11:59 PM local time)	—