Integrating Climate Change into Architecture Programs

Accelerating Climate Education (ACE) Curriculum Brief

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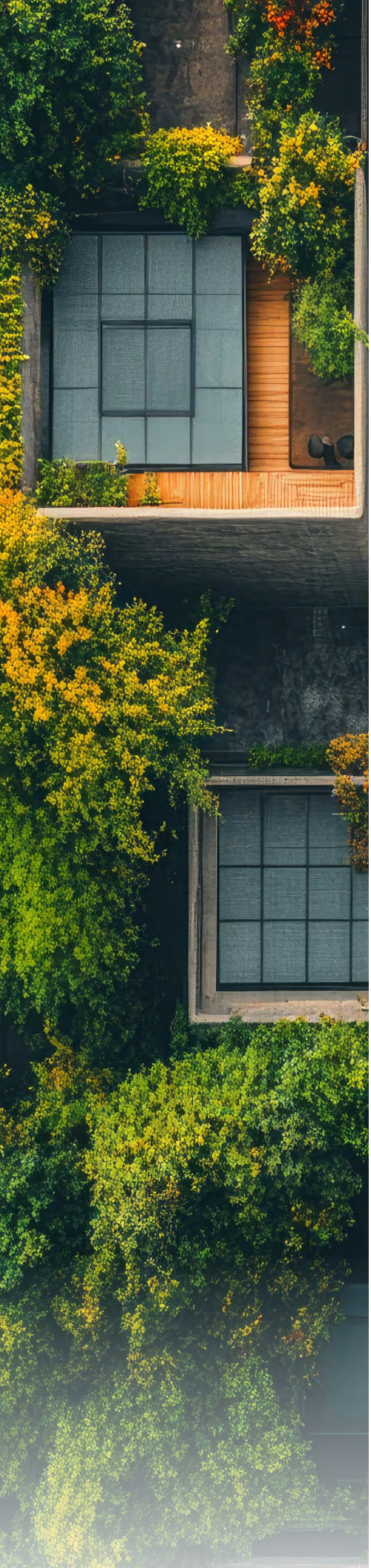
UNIVERSITY OF WATERLOO | WATERLOO Climate Institute



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OVERVIEW

The Waterloo Climate Institute's Accelerating Climate Education (ACE) project is a three-year initiative (2024-2026) to support the rapid integration of climate change adaptation knowledge and skills into professional degree programs at universities and colleges across Canada. The ACE project focuses primarily on accounting, architecture, engineering and planning programs and is intended to contribute to the implementation of Canada's National Adaptation Strategy: Building resilient communities and a strong economy. The project creates opportunities for dialogue, networking and collaboration with other higher education institutions across Canada to support and share efforts and to engage with professional accreditation bodies to support broader integration of climate adaptation competencies into these professions. Visit the ACE project website for more information.

Integrating climate adaptation into the curriculum creates opportunities to embed justice, decolonization, and reconciliation perspectives within existing programs and courses, while also strengthening and connecting to ongoing climate, biodiversity and sustainability education initiatives across Canadian post-secondary institutions.

This curriculum brief is not prescriptive. It is intended to provide a catalyst for dialogue about curriculum revisions in architecture programs in Canada and can be used as a starting point to consider possible content and pedagogical approaches. It is organised into four sections:

1. **The Curriculum Challenge** - an overview of the relevance of climate change to architecture education
2. **Climate Change Competencies** - a list of competencies based on current accreditation guidance and Canada's Climate Action Competency Framework (CACFv2)
3. **Further Reading** - a bibliography of current literature on climate change and architecture education
4. **Resources** - websites, toolkits, guidebooks and other resources that can be used to develop teaching/learning activities for architecture courses

1 - The Curriculum Challenge

Like many professional degree programs, the architecture curriculum is governed by competencies defined by a Canadian professional accreditation body. Currently, climate change and sustainability do have some presence in these competencies, but the professional associations are recognizing the need to update the curriculum to ensure that students graduate with the knowledge and skills needed to be successful in a climate-changing world and contribute to a just, sustainable, resilient, and low carbon future.

In Canadian architecture education, the impetus for addressing climate change is quite clear:

- The Royal Architecture Institute of Canada launched a Climate Action Plan in 2025, and one of the four pillars is focused on education and training, including working with architecture schools and research institutions to ensure that future architects are well-prepared to address the complex challenges facing society and the architecture profession.
- The Canadian Architectural Standards Board recently signed an Equitable Climate Action Commitment formalizing the organization's responsibility to address climate change mitigation and adaptation through timely and ethical climate planning and action.

A national survey of climate change in architecture programs at Canadian universities led by the Waterloo Climate Institute found that 95% of them believe that CC is highly relevant for their students' careers and 70% of them are already starting to integrate climate change into courses and learning outcomes. However, integration across courses faces financial and time constraints as well as the need to cover other accreditation materials. See Figure 1 for more information about the survey findings.

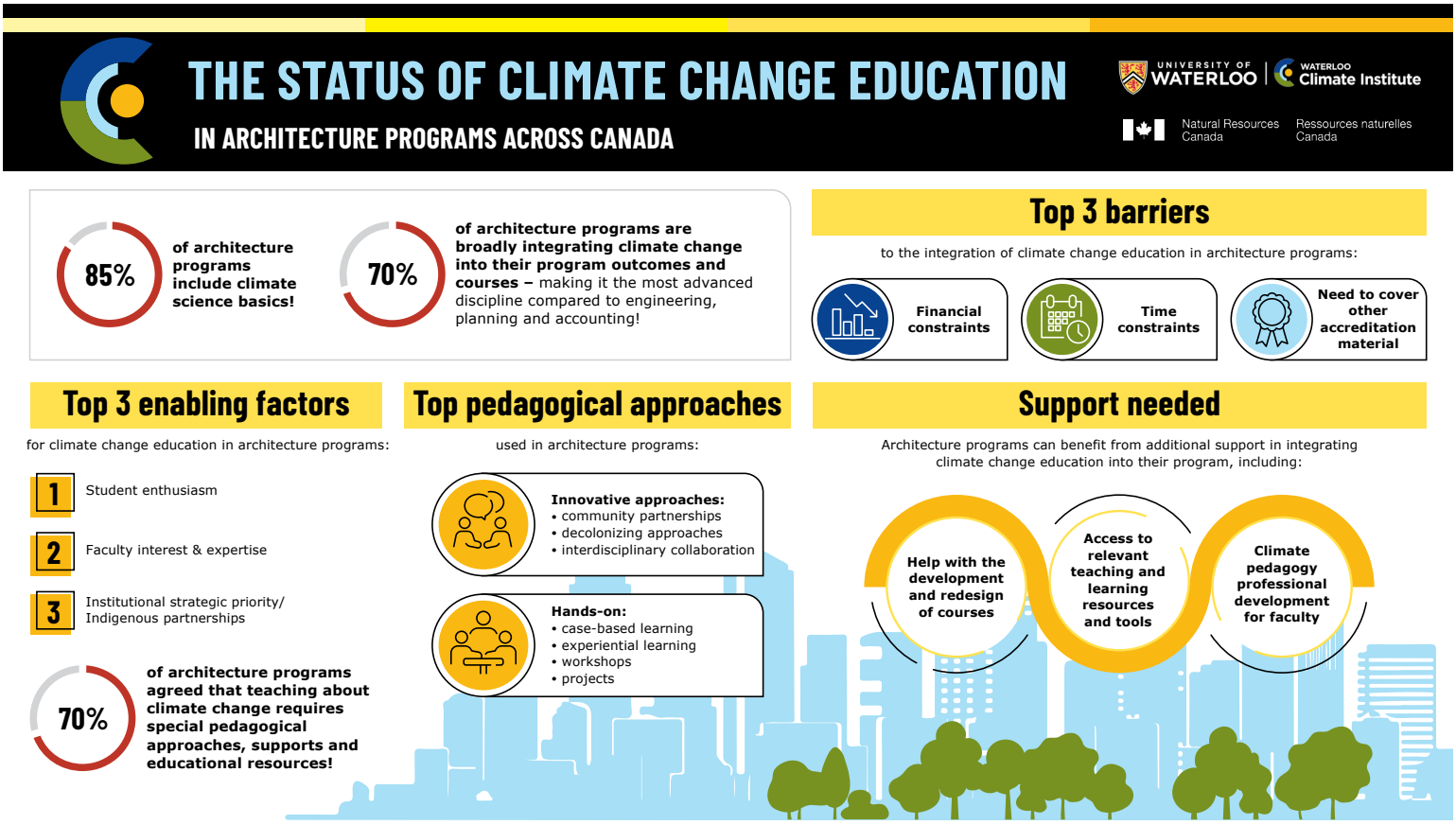

Figure 1. The status of climate change education in architecture programs across Canada

Clearly, the profession of architecture has already embraced the need to consider climate change in all aspects of work, and the task ahead is to build on and improve climate change education offerings in undergraduate and graduate architecture programs. This can be done in different ways including:

1. Developing a new core/mandatory course or module on climate change and architecture early in the program
2. Integrating climate change content competencies into existing courses
3. Collaborating with other faculties to develop new interdisciplinary courses and/ or encouraging students to take climate courses offered by other faculties or departments
4. Looking at ways to incorporate extra-curricular climate learning opportunities on campus into existing architecture courses

2 - Climate Change Competencies for Architects

What climate change knowledge and skills should architects have?

Natural Resources Canada suggests using the Climate Action Competency Framework to develop learning outcomes for climate education and training. This framework was developed by the Design by Resilience Lab at Royal Roads University in collaboration with many partners from academia, industry and government. The framework is organised under 6 themes: 1) Working Together; 2) Climate Action Leadership; 3) Capacity Building; 4) Climate Risk Assessment; 5) Solution Design; and 6) Effecting Change.

Some key climate change competencies for Canadian architecture education programs that align with the CACFv2 and the CACB Student Performance Criteria might include the following (see Table 1):

Table 1. Climate change competencies for architecture programs

THEME	POTENTIAL LEARNING OUTCOMES Graduates should be able to:	RELEVANT SPC (CACB)
Climate Literacy & Applied Climate Science	• Explain fundamental climate science, anthropogenic drivers, and projected climate impacts at multiple scales (site --> building --> city). • Interpret climate data, extreme weather projections, and local hazard information to inform design decisions. • Evaluate ecological systems and site conditions (hydrology, biodiversity, microclimate) through a climate lens. • Identify relationships between buildings, carbon emissions, energy consumption, and the environment.	B5 Ecological Systems, A5 Site, C5 Environmental Systems
Climate Risk Assessment & Resilient Design	• Conduct hazard, exposure, and vulnerability assessments for buildings and urban spaces. • Integrate resilience strategies into architectural and urban design, addressing overheating, flooding, wildfire smoke, storm impacts, and power outages. • Design for durability, adaptive capacity, long-term performance, and occupant health. • Evaluate how structural, envelope, and mechanical systems respond to climate hazards.	A5 Site, A6 Urban Design, C3 Structural Systems, C4 Envelope
Low-Carbon Design & GHG Reduction	• Quantify operational and embodied carbon using accepted methods and tools. • Select low-carbon materials, assemblies, and systems based on life-cycle carbon and performance data. • Apply passive design strategies, energy modelling, and renewable energy integration. • Optimize building form, envelope, and environmental systems for energy and carbon performance.	C2 Materials, C4 Envelope, C5 Environmental Systems, A2/ A3 Design Skills & Tools
Sustainable & Regenerative Site and Urban Design	• Integrate blue-green infrastructure, nature-based solutions, and ecological restoration into site and campus design. • Understand urban systems (transportation, density, land use) and their climate implications. • Mitigate heat island effects, support biodiversity, and promote climate-positive public realm strategies. • Plan for integrated, systems-scale urban resilience and sustainability initiatives.	A5 Site, A6 Urban Design, B5 Ecological Systems

Climate-Informed Design Decision-Making	• Use climate-relevant modelling tools (energy, daylight, wind, thermal comfort) to inform early design decisions. • Frame design problems using climate data, user needs, cultural context, and equity considerations. • Integrate climate criteria into program analysis, design iteration, and technical detailing. • Communicate how design strategies improve resilience, reduce emissions, and enhance long-term value.	A1–A4 Design Foundations & Analysis, B1 Critical Thinking & Communication, A7 Detail Design
Codes, Standards, and Climate Policy Literacy	• Interpret and apply climate-relevant building codes, energy requirements, environmental standards, and municipal policies. • Navigate evolving regulatory landscapes (e.g., net-zero codes, embodied carbon policies, resilience guidelines). • Understand how regulatory systems influence project delivery, risk management, and design choices including Indigenous groups. • Explain how strategic decisions support or undermine the entity's long-term sustainability goals.	C1 Regulatory Systems, E2 Ethics & Legal Responsibilities
Climate-Related Financial & Risk Management Skills	• Recognize how climate risks affect project economics, insurance, and lifecycle costing. • Articulate the financial benefits of resilient and low-carbon design. • Integrate climate considerations into project management, procurement, and contract strategies.	E3 Modes of Practice, E5 Project Management, D1 Comprehensive Design
Ethical, Cultural, and Community-Centered Climate Practice	• Engage communities, clients, and stakeholders in climate-informed decision-making. • Address climate justice, equity, and the uneven distribution of climate impacts. • Understand Indigenous knowledge systems and local cultural relationships to land, resources, and stewardship. • Uphold ethical responsibilities to protect public well-being in a changing climate.	B4 Cultural Diversity, E1 Profession, E2 Ethics, A4 Program Analysis
Collaboration, Communication, and Interdiscipinary Climate Practice	• Work effectively with engineers, planners, climate scientists, and allied professionals. • Communicate climate risks and solutions clearly to clients, decision-makers, and communities. • Facilitate interdisciplinary problem-solving and integrate diverse expertise into design.	B1 Communication, D1 Comprehensive Design, E4 Contracts
Lifelong Learning & Climate Leadership	• Maintain up-to-date knowledge of evolving climate science, policies, materials, and technologies. • Demonstrate leadership in advancing sustainable and resilient practices in firms and communities. • Advocate for climate-aligned design standards and professional ethics.	E1 Architectural Profession, E2 Ethics, D1 Comprehensive Design

(NOTE: this list was generated by ChatGPT on December 12, 2025, in response to the prompt: "Please list climate change competencies for Canadian architecture education programs based on the CACFv2 and the CACB's student performance criteria".)

3 - Further Reading on Sustainability/Climate in Architecture Education

There is a growing body of research and literature on climate change, architecture, competencies, pedagogy and curriculum. Here are some resources to get started:

Bailey, S., Black, H. and Coar, L. (2021). Decolonizing the Design Process with Five Indigenous Land-Based Paradigms. Canadian Architect. May 2021. https://www.canadianarchitect.com/decolonizing-the-design-process-with-five-indigenous-land-based-paradigms/.

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Brogden, L., Iftikhar, N., Oldfield, P., Stead, N., Kessler, C., Knapp, C., & Reinhardt, D. (2022). Climate literacy and action in architecture education: Australasian perspectives.

Fallmann, J., & Emeis, S. (2020). How to bring urban and global climate studies together with urban planning and architecture? Developments in the Built Environment, 4, 100023.

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Peters, T. and Kesik, T. (2023). Benchmark 2023: Future Forward—Adaptive Change in Architecture Education and Practice.

Royal Institute of British Architects. (n.d.). Core curriculum topic: Sustainable Architecture.

Roaf, S. (2024). Architecture for a different future. In Living with Climate Change (pp. 67-88). Elsevier. https://doi.org/10.1016/j.rser.2014.02.036.

Schiano-Phan, R., & Soares Gonçalves, J. C. (2022). Sustainability in Architectural Education. Sustainability, 14(17), 10640.

Stupar, A., Mihajlov, V., & Simic, I. (2017). Towards the conceptual changes in architectural education: Adjusting to climate change. Sustainability, 9(8), 1355. https://doi.org/10.3390/su9081355.

Travers, S. E. (2025). Home on Native Land: Decolonizing Architectural Education Through Indigenous Collaboration (Doctoral dissertation, Carleton University).

4 - Resources

Resources from Professional Bodies:

- American Institute of Architects (AIA). Framework for Design Excellence.
- AIA. Design Tools to Stop Climate Change.
- AIA. Climate Adaptation Design Resources.
- Carbon Leadership Forum. Life Cycle Assessment of Buildings: A Practice Guide.
- RAIC/IRAC. (2025). Climate Action Plan.
- The Royal Institute of British Architects (RIBA). Guide to sustainable outcomes for architecture.
- Architecture without Borders (Quebec): Flood Resilience.

Government of Canada:

- Canada's Climate Adaptation Platform.
- Canada's National Adaptation Strategy: Building resilient communities and a strong economy. (2023) https://www.canada.ca/en/ services/environment/weather/climatechange/climate-plan/national-adaptation-strategy.html.
- 2030 Emissions Reduction Plan: Canada's Next Steps for Clean Air and a Strong Economy.(2022). https://www.canada.ca/en/services/environment/weather/climatechange/climate-plan/climate-plan-overview/emissions-reduction-2030.html.
- Climate Change Strategies and Initiatives.
- Infrastructure Canada's Climate Lens.
- Canada in a Changing Climate Reports.
- Canada's Fourth Biennial Report on Climate Change to the UNFCC (2022).

Useful tools and websites:

- Climate Atlas of Canada Interactive Map of climate impacts. Also see: https://climateatlas.ca/relationships-for-change.
- Climate Insight – platform for climate ready housing and infrastructure in Canada.
- ClimateData.ca - high-resolution climate data to help build a more resilient Canada.
- CanAdapt - a collective of Canadian professionals, organizations, and networks working to help Canadian communities and industries adapt to climate change and become more sustainable.
- Housing and Infrastructure Communities Canada HICC: Climate Toolkit for Housing and Infrastructure.
- Pembina Institute. Buildings Focus Area.
- UNCCe-Learn: Free online module: Cities and Climate Change.
- University of Waterloo School of Architecture. Arriscraft Speaker Series on Climate Change Adaptation (webinar recordings).
- World Bank. (2021). A catalogue of nature-based solutions for urban resilience. Available here.