



Pacific Institute
for Climate Solutions
Knowledge. Insight. Action.

Climate Change Courses in British Columbia Postsecondary Institutions

A Scoping Review

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EXECUTIVE SUMMARY

The mandate of the Pacific Institute for Climate Solutions (PICS) includes the evaluation and strengthening of educational and capacity-building strategies to address climate change and communicating climate change issues to government, industry and the general public. To inform these objectives, a review of climate change related courses available through educational institutions in the British Columbia (BC) postsecondary system was conducted.

This review is limited to the 37 educational institutions included in the BC postsecondary system. This includes the four research intensive universities (SFU, UBC, UNBC and UVic), 11 public colleges, seven teaching-intensive universities, three institutes and 11 private institutions as well as two out-of-province institutions. Course offerings at each institution were obtained from 2010/2011 course listings published in academic calendars as available on institution websites. Available course information was reviewed and classified to describe the extent to which the course content was focused on climate change (tiers) and which climate change themes were addressed (climate science, regional climate change and impacts, adaptation and mitigation). A summary of course offerings at each institution is presented in the report and a complete listing by institution is available.

This review found a total of 383 climate change related courses offered by the 37 institutions. At least one climate change related course was found at 32 of the 37 institutions reviewed. Courses focused on climate change as a main topic (Tier 1) were found at 14 institutions (89 courses). Tier 2 courses, which have climate change as a core topic, were found at 21 institutions (99 courses), and Tier 3 courses, which include climate change as a topic within a course section, were found at 30 institutions (195 courses). Courses addressing climate science were found at 28 institutions (126 courses), climate change impacts at 27 (163 courses), adaptation at 20 (118 courses) and mitigation at 9 institutions (65 courses).

Findings are also discussed in terms of course accessibility, program type (undergraduate, graduate and continuing studies), and regional distribution of course delivery. Of the course totals, 49% (188) were found at the four collaborating PICS universities. The seven teaching-intensive institutions offered 77 courses (20%). The majority of climate change related courses found (302) were at the undergraduate level. Graduate level courses were found at seven institutions (33 courses). Continuing studies/part time courses were found at five institutions (48 courses) and include certificate programs at UBC (Certificate in Decision Making for Climate Change and Sustainability Management Program), Royal Roads University (Carbon and Energy Leadership Program), BCIT (Sustainable Energy Management Associate Certificate) and Vancouver Island University (Renewable Energy Technology Certificate).

The greatest number of courses, (166 or 45% of the total), are offered in the BC lower mainland which is the region with the most postsecondary institutions (17) including two major universities (SFU and UBC) and the largest institute, BCIT. The Kootenay/Rockies region, with two public colleges, had the least number of courses (seven or 2%). A total of 42 online courses were found, including programs at UBC Continuing Studies (Certificate in Decision Making for Climate Change), Vancouver Island University (Renewable Energy Technology Certificate) and Yukon College (Bachelor of Circumpolar Studies).

These research results provide a comprehensive survey of the current status of climate change education in the BC postsecondary education system, and offers preliminary analysis of gaps in the current situation. The report provides information of value to postsecondary institutions and for BC government labour market analysts and it serves to inform collaborative discussion, and can be used as a springboard for further research and analysis.

1. INTRODUCTION

Creating a sustainable society requires that individuals and organizations have the knowledge, skills, values, capacity and motivation to respond to the complex issues they encounter in their personal and working lives (Tilbury et al, 2005). Empirical studies of other jurisdictions have identified gaps in institutional knowledge building capacity and workforce needs, and suggest that educational institutions have yet to undertake necessary innovations and transformation to address the needs. Forecast models reported by Human Resources and Social Development Canada (HRSCD) predict that about 65.9% of job openings between 2006 and 2015 are expected to be in occupations usually requiring postsecondary education (university, college, or apprenticeship training) and in management occupations in all industries (Lapointe et al, 2006).

According to a 2007 report produced by Environmental Careers Organization (ECO Canada 2007), one of the most critical issues facing Canada's environmental sector is a shortage of skilled labour to fill the growing demand for environmental employees. The demand for environmental employees specifically is expected to increase by 1.6% between 2006 and 2011. By contrast, employment in all industries was expected to increase by 1.4% (Ibid).

This report will describe what courses are available from the educational institutions in BC and how accessible they are to BC residents. This review is limited in scope to educational institutions included in the BC postsecondary system (British Columbia Council on Admission and Transfer - BCCAT) listed in Table 1. The BC postsecondary system is made up of 37 institutions including the four major research-intensive universities that are the PICS collaborators - the University of Victoria (UVic), the University of British Columbia (UBC), the University of Northern British Columbia (UNBC), and Simon Fraser University (SFU). Also included are public colleges (11), teaching-intensive universities (7) and institutes (3) and private institutions included in the BC Transfer System (11). The BC Transfer System also includes two out-of-province institutions, Athabasca University (Alberta) and Yukon College (Yukon) that offer transferable courses to BC institutions. Online offerings from these institutions were included in this study.

2. METHODOLOGY

Course offerings at each institution were obtained from 2010/2011 course listings published in academic calendars as available on institution websites (Appendix 1). Calendars were searched using appropriate keywords and commonly relevant departments were browsed in an attempt to find all relevant courses. The initial course listing was developed by students in the University of Victoria's Masters of Public Administration program. Listings for the four PICS universities were provided by each institutions PICS campus coordinator, prepared in consultation with faculty and staff at the universities. The final list was compiled and enhanced by UVIC PICS staff.

Available course information was reviewed and courses were classified into tiers and themes. Tiers describe the extent to which each course was focused on climate change. They were defined as follows:

Tier 1. Climate change is the main focus of the course. This includes those with climate change in the course title and those which focus on one or more of the themes below. For example, this would include courses focusing on climatology (climate science theme) or clean energy (mitigation theme).

Tier 2. Climate change is a core topic. This includes courses that have the climate change theme in the description as a main topic or module.

Tier 3. Climate change is included to a lesser extent - as a topic of a module or section of the course. Tier 3 courses may or may not mention climate change in the description therefore what to include as being applicable to climate change is problematic. In general those courses that include “current environmental issues” in the description would be included.

Themes were defined as per the climate change themes developed for PICS educational material such as Climate Change 101, a course currently being developed for the BC civil service. Individual courses can address one or more of the climate change themes. These are:

Theme 1. Climate Change Science

Theme 2. Regional Climate Change and its Impacts

Theme 3. Adaptation - the adoption of new policies and support systems to cope with the consequences of climate change

Theme 4. Mitigation - actions aimed at reducing greenhouse gas emissions.

Research-intensive Universities	Teaching-intensive Universities
Simon Fraser University University of British Columbia University of Northern British Columbia University of Victoria	Capilano University Emily Carr University of Art and Design Kwantlen Polytechnic University Royal Roads University
Public Institutes British Columbia Institute of Technology Justice Institute of British Columbia Nicola Valley Institute of Technology	Thompson Rivers University University of the Fraser Valley Vancouver Island University
Private Institutions Alexander College Art Institute of Vancouver Columbia College Coquitlam College Corpus Christi College Fairleigh Dickinson University Fraser International College Quest University Sprott-Shaw Degree College Trinity Western University University Canada West	Public Colleges Camosun College College of New Caledonia College of the Rockies Douglas College Langara College North Island College Northern Lights College Northwest Community College Okanagan College Selkirk College Vancouver Community College
	Out-of Province Athabasca University (Alberta) Yukon College (Yukon)

Table 1. Educational institutions included in the BC postsecondary system. Out-of-province institutions listed are part of the BC Transfer System.

3. COURSES OFFERED BY INSTITUTION

Review of online academic calendar information for the 37 BC postsecondary and transfer system member institutions found a total of 383 climate change related courses. Of the institutions searched, 32 were found to offer at least one climate change related course. No climate change related course offerings were found at five institutions including the Justice Institute of BC, Corpus Christi College, Farleigh Dickinson University, Fraser International College and Sprott-Shaw Degree College, and are not included in further discussions.

A summary of the number of courses by institution is provided in Table 2. This table includes the total number of courses found, the number of courses in each tier, and the number of courses addressing the four climate change themes. The institution type and location is also provided.

A brief overview of climate change courses offered at each institution follows, organized alphabetically. A full listing of climate change related courses from all institutions, with course numbers and descriptions, is available as a separate document (Climate Change Course List).

Alexander College

Alexander College (Lower Mainland) offers two courses that include climate change. These are a Tier 2 course in Environmental Chemistry (climate science theme) and a Tier 3 Environmental Economics course (impacts and adaptation themes).

Athabasca University

Athabasca University (Alberta) is a member of the BC transfer program, offering online courses. This institution offers 12 climate change related courses in a variety of disciplines including biology, chemistry environmental science, environmental studies, geography, global studies, philosophy and political science. All 12 courses are Tier 3 and cover the climate change themes of climate science (3), impacts (4) and adaptation (7). One of these is a graduate level course.

British Columbia Institute of Technology

The British Columbia Institute of Technology (BCIT, Lower Mainland) was found to offer 34 climate change related courses in Tier 1 (23) Tier 2 (6) and Tier 3 (5) and address climate science (5), impacts (7), adaptation (4) and mitigation (24). Undergraduate courses (17) are offered in ecological restoration, civil engineering, environmental engineering technology, and sustainable resource management. One graduate course in engineering is offered.

BCIT also offers a part-time studies Sustainable Energy Management Associate Certificate (SEMAC) program through the Centre for Energy Systems Applications. The SEMAC program is a partnership between BC Hydro and BCIT, with funding support from the Natural Resources Canada - Office of Energy Efficiency. SEMAC provides graduates with the skills and knowledge of sustainable energy management principles, approaches, techniques, and tools, in order to be able to function quickly and effectively in the position of energy manager or energy coordinator at their company or building. SEMAC includes 16 courses (Tier 1, mitigation theme).

Camosun College

Camosun College (Vancouver Island) offers two climate change related courses, a Tier 2 course in geography and a Tier 3 course in environmental technology. Both address the climate science theme.

Capilano University

Capilano University (Lower Mainland) was found to have 12 climate change related course offerings in art history, biology, economics, geography, global studies, political science, psychology, social sciences and tourism management. These courses are classified as Tier 1 (2), Tier 2 (4) and Tier 3 (6), and include coverage of climate science (4), impacts (4), adaptation (10) and mitigation (1). All courses are undergraduate level (Associate of Arts/ Science; Bachelor of Tourism Management).

College of New Caledonia

The College of New Caledonia (Northern BC) has 3 Tier 3 geography courses that include climate change. Themes covered include climate science (2) and impacts (1).

College of the Rockies

The College of the Rockies (Kootenay/Rockies) was found to offer five Tier 3 climate change related courses in chemistry, economics, environmental studies, geography and management (business administration). These courses address climate science (2), impacts (1) and adaptation (2).

Columbia College

Columbia College (Lower Mainland) offers a chemistry course (Tier 3, climate science theme) and a geography course (Tier 3, climate science and impacts themes). The geography course is high school level intended for university transfer credit.

Coquitlam College

Coquitlam College (Lower Mainland) offers two university transfer courses in geography. Both are Tier 3 courses and include climate science.

Douglas College

Douglas College (Lower Mainland) has six climate change related courses available in Tier 2 (3) and Tier 3 (3). Courses are offered in chemistry, economics, geography and science, and address climate science (4), impacts (3) and adaptation (2).

Emily Carr University of Art and Design

Emily Carr University of Art and Design (Lower Mainland) offers a humanities course (environmental ethics) that includes climate change as a topic of discussion (Tier 3, mitigation).

Kwantlen Polytechnic University

Kwantlen Polytechnic University (Fraser Valley) offers 10 climate change related courses in geography, economics, environmental protection technology, philosophy, and political science. Courses offered are in Tier 1 (2), Tier 2 (2) and Tier 3 (6). Themes addressed by these courses include climate science (4), impacts (3), adaptation (6) and mitigation (1).

Langara College

Langara College (Lower Mainland) offers nine climate change related courses in Tier 1 (1), Tier 2 (3) and Tier 3 (5). These courses are offered in biology, geography, geology, health sciences, philosophy and sociology, addressing climate science (2), impacts (4) and

adaptation (2). Langara College also has the Langara Environment Institute seminar, which offers collaborative learning on many environmental topics, including climate change.

Nicola Valley Institute of Technology

Nicola Valley Institute of Technology (Thompson/Okanagan/Cariboo) was found to offer one climate change related course in environmental sciences (Tier 2, impact theme).

North Island College

North Island College (Vancouver Island) offers a Tier 2 course in physical geography that addresses climate science as a main topic.

Northern Lights College

Northern Lights College (Northern BC) offers two climate change related courses. There is a Tier 3 geography course addressing climate science, and a Tier 3 adventure tourism course addressing impacts.

Northwest Community College

Northwest Community College (Northern BC) has six climate change related courses offered in biology, geography, oceanography and political science (2 in Tier 2 and 4 in Tier 3). These courses address climate science (3) and impacts (5).

Okanagan College

Okanagan College (Thompson/Okanagan/Cariboo) offers seven courses related to climate change. There are offered as Tier 2 (5) and Tier 3 (2) courses in chemistry, earth and environmental science, economics, geography and physics. These courses are focused on climate science (6) and impacts (1). One Tier 3 geography course is delivered by distance education (online).

Quest University

Quest University (Lower Mainland) offers seven courses related to climate change. Course topics include past and present climate, ecology, environmental changes and human health, marine and coastal conservation, physical sciences (earth/oceans/space) and world food systems and are classified in Tier 1 (1), Tier 2 (3) and Tier 3(3). These courses address climate science (3) and impacts (5). Quest University courses are offered as a liberal arts/science degree and are delivered in an intensive, short-term format.

Royal Roads University

Royal Roads University (Vancouver Island) was found to offer 12 courses that include climate change. Offerings include one undergraduate course in environmental science (Tier 2, climate science) and one graduate course in environment and management (Tier 2, impacts and adaptation). RRU Continuing Studies offers the Carbon and Energy Leadership Program. This program includes 10 courses (9 in Tier 1, 1 in Tier 3) dealing with climate science (2), impacts (1), adaptation (5) and mitigation (5).

Selkirk College

Selkirk College (Kootenays/Rockies) offers two climate change related courses. These include a Tier 2 course in peace studies (impact theme) and a Tier 3 economics course (adaptation theme). The Selkirk College calendar also mentions a Certificate in Renewable

Energy, however the availability of this program is under review and course details were not available.

Simon Fraser University

Simon Fraser University (SFU) had 23 climate change related courses; three in Tier 1, seven in Tier 2 and 13 in Tier 3. Climate change themes addressed include climate science (2), impacts (14) and adaptation (8). SFU offers 18 undergraduate courses in communications, economics, earth sciences, environmental science, geography, health sciences, political science and resource and environmental management. Graduate level courses are offered in resource and environmental management (4) and economics (1).

Thompson Rivers University

Thompson Rivers University (Thompson/Okanagan/Cariboo) was found to offer 12 climate change related courses. Of these, eight are offered at the university campus and four are offered through TRU Online. The eight courses offered at the campus include biology, chemistry, forestry and geography and address climate science (6) and impacts (2) in Tier 2 (2) and Tier 3 (6). TRU Online offers four courses in geography and environmental studies addressing climate science (1), impacts (3) and adaptation (1). These courses are classified as Tier 1 (1), Tier 2 (1) and Tier 3 (2).

Trinity Western University

Trinity Western University (Fraser Valley) offers seven undergraduate courses; one in Tier 1, one in Tier 2 and five in Tier 3. Courses are offered in chemistry, geography and political science and address themes of climate science (3), impacts (3) and adaptation (5).

University of British Columbia

A total of 73 climate change related courses were found at the University of British Columbia (UBC) including 66 offered through the Vancouver campus and seven offered at UBC Okanagan. Course offerings include 13 in Tier 1, 20 in Tier 2 and 40 in Tier 3. Climate change themes addressed include climate science (28 courses), impacts (30), adaptation (28) and mitigation (8).

At the UBC Vancouver campus 37 undergraduate courses are offered in architecture and landscape architecture, arts and science interdisciplinary studies, biology, chemistry, clean energy and engineering, earth and ocean science, economics, environmental science, forestry, geographical biosciences, geography, history, land and food systems, natural resources conservation, physics and astronomy and political science. UBC Vancouver offers 14 graduate courses in chemistry, community and regional planning, economics, food and resource economics, geography, population and public health, resource management and environmental studies and statistics. Graduate courses include two Tier 3 courses on watershed management delivered online. Continuing Studies offers two programs related to climate change. The Sustainability Management Program includes four courses addressing climate change. The Certificate in Decision Making for Climate Change consists of four courses covering all four climate change themes. This program is delivered entirely online in collaboration with Northwestern University, the University of California-Irvine, and the University of Washington.

UBC Okanagan offers seven undergraduate courses in earth and environmental science, geography, physics and chemistry. These courses, found in Tier 1 (1), Tier 2 (4) and Tier 3 (2) address climate science (7) and impacts (3).

University Canada West

University Canada West (Lower Mainland) offers two courses that include climate change. These are a Tier 3 geography course that includes climate science theme and a Tier 2 course on ecosystems and sustainable development that addresses impacts.

University of the Fraser Valley

The University of the Fraser Valley (Fraser Valley) offers eight climate change related courses in anthropology, economics, geography and philosophy. These courses were classified as Tier 1 (4) and Tier 3 (4), and address climate science (4), impacts (4), adaptation (5) and mitigation (1).

University of Northern British Columbia

The University of Northern British Columbia (UNBC) was found to have a total of 42 climate change related courses offered in Tier 1 (3), Tier 2 (14) and Tier 3 (25). Of the 42 courses, climate science was addressed in 10, impacts in 24, adaptation in 11 and mitigation in three. Undergraduate courses including climate change (34) are offered in biology, chemistry, economics, environmental planning, environmental science and engineering, environmental studies, forestry, geography, international studies, natural resources management and physics. Graduate courses (7) are offered in environmental science and engineering, international studies and natural resources and environmental studies. UNBC also offers one continuing studies course in business, titled Introduction to Carbon Offset Development (Tier 1, Mitigation).

Vancouver Island University

Vancouver Island University (Vancouver Island) was found to offer 22 climate change related courses. The majority of these courses (13) are part of VIU's Renewable Energy Technology Certificate Program, which focuses on renewable energy and the various technologies of renewable energy. The program is delivered fully online. This program consists of 13 courses, all of which are focused on renewable energy technology (Tier 1, mitigation). The program includes an introduction to solar, wind, geo-exchange, biomass, and micro-hydro energy options, as well as energy conservation measures.

In addition to the renewable energy program, VIU offers nine climate change related courses in chemistry, earth sciences, fisheries and aquaculture, geography and science (education). These courses address climate science (6), impacts (4) and adaptation (1) in Tier 1(1), Tier 2 (3) and Tier 3 (5).

Yukon College

Yukon College (Whitehorse, Yukon) is also a member of the BC transfer system. Online courses only have been included in this review. Yukon College offers six online courses associated with a Bachelor of Circumpolar Studies (BCS). The BCS is a signature program of the University of the Arctic, a cooperative network of circumpolar universities, colleges, and other organizations committed to higher education and research in the North. These courses address climate science (1), impacts (6) and adaptation (3) and are classified as Tier 2 (2) and Tier 3 (4).

Institution Name	Institution Type	Location	Total Courses	Courses by tier			Courses addressing themes			
				Tier 1	Tier 2	Tier 3	Science	Impacts	Adaptation	Mitigation
Alexander College	Pr	LM	2	0	1	1	1	1	1	0
Athabasca University	OP	OP	12	0	0	12	3	4	7	0
BC Institute of Technology	In	LM	34	23	6	5	5	7	4	24
Camosun College	Co	VI	2	0	1	1	2	0	0	0
Capilano University	TI	LM	12	2	4	6	3	4	4	7
College of New Caledonia	Co	N	3	0	0	3	2	1	0	0
College of the Rockies	Co	KR	5	0	0	5	2	1	2	0
Columbia College	Pr	LM	2	0	0	2	2	1	0	0
Coquitlam College	Pr	LM	2	0	0	2	2	0	0	0
Douglas College	Co	LM	6	0	3	3	4	3	1	0
Emily Carr University of Art	TI	LM	1	0	0	1	0	0	1	0
Kwantlen Polytechnic University	TI	FV	10	1	2	7	4	3	6	1
Langara College	Co	LM	9	1	3	5	2	4	2	0
Nicola Valley Institute of Technology	In	TO	1	0	1	0	0	1	0	0
North Island College	Co	VI	1	0	0	1	1	0	0	0
Northern Lights College	Co	N	2	0	0	2	1	1	0	0
Northwest Community College	Co	N	6	0	2	4	3	5	0	0
Okanagan College	Co	TO	7	0	5	2	6	1	0	0
Quest University	Pr	LM	7	1	3	3	3	5	0	0
Royal Roads University	TI	VI	12	9	2	1	2	2	5	5
Selkirk College	Co	KR	2	0	1	1	1	1	0	0
Simon Fraser University	RI	LM	23	3	7	13	2	14	8	0
Thompson Rivers University	TI	TO	12	1	3	8	7	6	1	0
Trinity Western University	Pr	FV	7	1	0	6	3	3	5	0
University Canada West	Pr	LM	2	0	1	1	1	1	0	0
University of British Columbia ²	RI	LM	73	13	20	40	28	30	28	8
University of Northern BC	RI	N	42	3	14	25	10	24	11	3
University of the Fraser Valley	TI	FV	8	4	0	4	4	4	5	1
University of Victoria	RI	VI	50	12	13	25	15	25	13	9
Vancouver Island University	TI	VI	22	14	3	5	6	5	2	13
Yukon College	OP	OP	6	0	2	4	1	6	3	0
Total Courses			383	88	97	198	125	163	110	71

Table 2. Number of climate change courses offered by educational institutions in the BC Postsecondary and Transfer System.

4. DISCUSSION

4.1 Data Limitations

It is recognized that the course listing provided may have errors and omissions, and there may be errors in course classifications assigned. The course listings and classifications were developed by review of available information found in current term academic calendars found on the Internet. Course descriptions are often very brief. Many courses included do not explicitly mention climate change, but do refer to environmental issues, and a judgement to include or not include was required. Coordinators at the four PICS collaborating universities gathered additional information on courses to confirm their content. No consultation with other institutions was made. Some courses offered in alternate years or terms may have been missed. Many upper level and graduate “special topics” and seminar courses may include relevant discussions, but were not included as this was not reflected in calendar information.

4.2 Course Content

Course information was classified into tiers and themes as an indication of course content (Table 3). The tiers provide information about the extent to which the course is focused on climate change. Themes provide information regarding course content relative to the climate change themes of climate science, regional climate change and impacts, adaptation to climate change and mitigation.

	Number by tier		Number of courses addressing climate change themes			
	Number of institutions	Number of courses	Science	Impacts	Adaptation	Mitigation
Tier 1	14	89	25	28	25	56
Tier 2	21	99	48	53	17	4
Tier 3	30	195	53	82	76	5
Total	65	383	126	163	118	65
Number of institutions with climate change themes			28	27	20	9

Table 3. Number of institutions offering climate change related courses by tier and theme, and the total number of courses offered by tier and theme.

Of the 383 total courses found, 89 were classified as Tier 1, 99 as Tier 2 and 195 as Tier 3. To recap, Tier 1 courses have climate change as the main focus, Tier 2 courses have a module or section focused on climate change and Tier 3 courses are those which have climate change as a topic of a course module. The number of institutions offering Tier 1 courses was 14. Tier 2 courses were found at 21 institutions and Tier 3 at 30 institutions.

In terms of themes addressed, regional issues and impacts was included in the most courses (163) followed by climate science (126), adaptation (118) and mitigation (65). Courses often cover more than one theme, therefore the total of courses covering each theme is greater than the actual total number of courses found (i.e., 469 by theme from 383 total courses). There were 14 “comprehensive” courses that appear to cover three or four of the themes. Courses addressing the climate science theme were found at 28 institutions, the impact theme at 27, adaptation at 20 and mitigation at nine.

Figure 1 shows the number of climate change courses addressing climate change themes by tier. Of interest in this figure is the high percentage of courses addressing the mitigation theme that are Tier 1. This grouping includes courses within several dedicated programs offered at BCIT (Sustainable Energy Management Certificate), Royal Roads University (Carbon and Energy Leadership Program), Vancouver Island University (Renewable Energy Program) UBC Continuing Studies (Certificate in Decision Making for Climate Change).

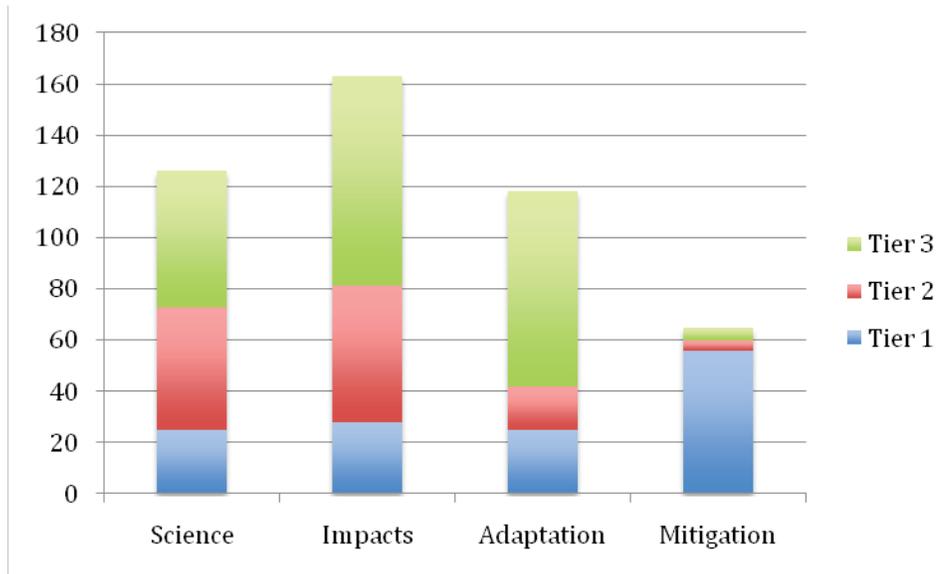


Figure 1: Number of courses addressing climate change themes categorized by course tiers.

Information compiled on each course included the department offering the course, and course number and title. This describes the “context” in which climate change is discussed. While there is no consistency in course or department naming, it appears that in general courses centered on addressing climate science were found mostly in the basic science departments (physical geography, earth and ocean sciences, chemistry, physics). Courses addressing mitigation were found in engineering and technology programs, and in programs offering broad based climate change coverage. Courses that address climate impacts and adaptation are found in a greater diversity of departments than those discussing science and mitigation. This diversity is an indication of the breadth of climate change issues and adaptation strategies making it into the education system.

4.3 Courses by Institution Type

The great majority of climate change related courses were found at the four major research intensive universities (Table 4). These institutions (SFU, UBC, UNBC and UVIC) accounted for 188 or 49 percent of the total courses found. The eight teaching-intensive institutions had 77 courses (20 %), followed by public colleges (43 or 11 %), Institutes (35 or 9 %), private institutions (22 or 6 %) and out-of-province (online only) institutions (18 or 5 %). These numbers, including the tier and theme coverage, reflect the size and the educational objectives of the institutions. For example, the major universities have broad coverage of climate change themes in all tiers. A large number of the courses are Tier 3 reflecting the broad range of subjects areas available at these institutions. The teaching-intensive institutions also provide broad theme coverage, however there appears to be greater emphasis on more focused Tier 1 and 2 courses. Colleges and private institutions offer relatively high percentage of climate science courses, possibly reflecting a focus on university transfer

credit courses that include climate change (e.g., Tier 3 geography courses). Similarly the main focus of institutes (i.e., BCIT) is on courses addressing mitigation (engineering and technology).

Institution type	Total courses	Courses by tier			Courses by theme			
		Tier 1	Tier 2	Tier 3	Science	Impacts	Adaptation	Mitigation
Research-intensive	188	31	54	103	55	93	60	20
Teaching-intensive	77	32	14	31	27	24	31	21
Institutes	35	23	7	5	5	8	4	24
Colleges	43	1	16	26	23	17	7	0
Private institutions	22	2	6	14	12	11	6	0
Out of province	18	0	2	16	4	10	10	0

Table 4. Climate change related course offerings by educational institution type.

4.4 Undergraduate, Graduate and Continuing Studies Programs

Courses are delivered as part of undergraduate (defined in this report to include university transfer and diploma programs), graduate programs and continuing studies (including part-time) programs. Undergraduate and graduate courses for the most part require enrollment in the institution and full time on campus attendance. Continuing studies programs do not require full time attendance and are therefore more accessible to the general public.

The majority of courses found (302) were at the undergraduate level. A further 33 were graduate level courses, and 48 were continuing studies (Figure 2).

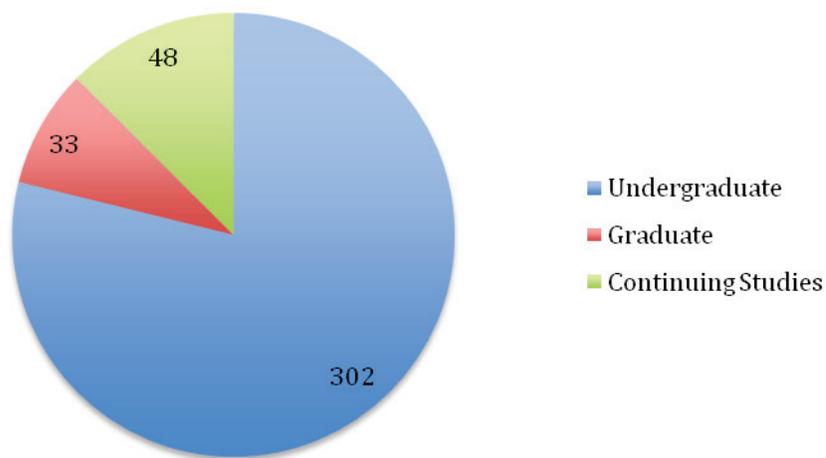


Figure 2: Number of courses in undergraduate, graduate and continuing studies programs.

Graduate courses are offered at seven institutions including SFU (5), UBC (14), UNBC (7), UVIC (4), BCIT (1), Royal Roads (1) and Athabasca University (1). Continuing studies/part time courses were found at five institutions. UBC offers two continuing studies programs, the Certificate in Decision Making for Climate Change (4 courses, online) and the Sustainability Management Program (4 courses). Royal Roads offers the Carbon and Energy Leadership Program (10 courses). BCIT offers the Sustainable Energy Management Associate Certificate (SEMACE) program (16 courses). Vancouver Island University offers the Renewable Energy Technology Certificate Program (13 courses online). UNBC offers one continuing studies business course focused on carbon offsets. No continuing studies course offerings were found at SFU, however there is a Certificate in Sustainable Community Development.

4.5 Course Access by Region

The province has been divided into six geographical areas (BCCAT). The number of courses available in each of these regions, not including out-of-province online courses, is summarized in Table 5.

Region	Total courses	Courses by tier			Courses by theme			
		Tier 1	Tier 2	Tier 3	Science	Impacts	Adaptation	Mitigation
Northern BC	53	3	16	34	16	31	11	3
Thompson, Okanagan, Cariboo	27	2	13	12	20	11	1	0
Kootenay/Rockies	7	0	1	6	2	2	3	0
Fraser Valley	25	7	3	15	11	10	16	2
Lower Mainland	166	42	44	80	47	67	56	33
Vancouver Island	87	35	20	32	26	32	21	27

Table 5. Regional distribution of climate change related courses in BC (out-of-province online courses not included).

The greatest number of courses, (166 or 45% of the total), are offered in the Lower Mainland region of BC. This region has the most postsecondary institutions (17) including two major universities (SFU and UBC) and the major Institute BCIT. Vancouver Island, with significant number of courses at UVIC, Royal Roads and Vancouver Island University, offers the next most (87 or 24%). Northern BC, with UNBC follows with 53 or 14% of the total courses found. The least number by region was found for Kootenay/Rockies with only seven courses (2%). This region has two public colleges.

4.6 Online Options

A total of 42 online climate change related course offerings were found. Institutions offering courses online include Athabasca University, Okanagan College, Thompson Rivers University Online (TRU Online), UBC, Vancouver Island University and Yukon College.

Athabasca University offers 12 courses online in a variety of disciplines (biology, chemistry, environmental science, environmental studies, geography, global studies, philosophy, political science). All are Tier 3 and include climate science, impacts and risks and adaptation as topics. One of these is graduate level. Okanagan College offers one Tier 3 geography course by distance education (online). TRU Online offers four online courses in geography (3) and environmental studies (1). UBC offers two Tier 3 graduate courses on watershed management online.

Online course offerings include three programs that address climate change and climate change themes. UBC Continuing Studies offers a Certificate in Decision Making for Climate Change (4 courses) entirely online. Yukon College offers six online courses associated with a Bachelor of Circumpolar Studies. Vancouver Island University offers the Renewable Energy Technology Certificate Program, which focuses on renewable energy and the various technologies of renewable energy. The program includes 13 courses is delivered fully online.

5. CONCLUSIONS

This scoping review is intended to provide a “snapshot” of the current state of climate change related courses offered through BC’s postsecondary education system. Information compiled for this review shows that, overall, a large number of courses that relate to climate change are available - 383 in total. Courses range from those focused specifically on climate change to courses that use climate change as an issue in discussing a broad range of fields of study. Climate change themes of climate science, regional climate change and impacts, adaptation to climate change and mitigation are all represented. This diversity is an indication of the breadth of climate change issues and adaptation strategies making it into the education system.

While there are a large number of institutions and course offerings addressing climate change overall, there are access barriers to most of these courses. The vast majority of courses are offered as part of undergraduate (including university transfer and diploma programs) and graduate studies, directed at full time students. There are several specific continuing studies and part-time programs offered that cater to a wider range of BC residents. While many institutions throughout the province offer significant numbers of climate change related courses, access and choice is greatest in proximity to the larger institutions, including the four PICS universities and BCIT. Online options for these courses help to address geographic limitations. The contributions of non-government and professional organizations to climate change education was not part of this scoping review, but should also be considered.

While this report describes the current status of postsecondary climate change offerings, it does not compare enrolment and graduation rates among students who have taken some of these courses with forecasted employers’ needs. Further labour market analysis is required to analyse the graduation rates for environment-related programs, or climate change programs as a proportion of all programs in the province and also to examine the current distribution of university and college-related programs. Some of the inherent challenges include defining where the environmental sector ends and other sectors begin (for example, pollution prevention vs. pollution abatement and control) and the challenge to stay on top of future growth expectations for worker demand in each subsector (i.e. science, modeling, adaptation and mitigation). For example the current market trends is for high growth in carbon and climate change mitigation and declining growth in conservation of wildlife fisheries and flat growth in water quality protection (ECO Canada 2010).

This report provides a comprehensive survey of the existing postsecondary climate change course offerings in British Columbia and offers preliminary analysis of gaps in the current situation. It does not offer an analysis of graduates of postsecondary institutions who have taken one or more climate change courses such as graduation rates by degree and region. However, the report provides information of value to postsecondary institutions and for BC government labour market analysts and it serves to inform collaborative discussion. Recommendations for next steps can be determined by considering the following:

1. Knowledge gaps in existing postsecondary institutions (i.e. area (or theme) and level (or tier) of information) vs employer needs;
2. Needs (demand) for building individual and organizational knowledge within the public and private sector;
3. Rate of change (supply) for college and university enrolment and graduation of select environment-related programs of study;
4. Changing organization labour needs with green technology advances; and
5. Organizational capacity and motivation to innovate and implement solutions around climate change.

6. RECOMMENDATION

Circulate the Information Note which accompanies this report to appropriate BC government decisions-makers (i.e. Ministry of Environment, Ministry of Advanced Education, Ministry of Jobs, Tourism and Innovation) and all postsecondary institutions surveyed in this report.

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APPENDIX 1. INSTITUTION WEBSITE URL'S

Institution	Home Page
Alexander College	http://www.alexandercollege.ca/
Athabasca University	http://www.athabascau.ca/
British Columbia Institute of Technology	http://www.bcit.ca/
Camosun College	http://camosun.ca/
Capilano University	http://www.capilanou.ca/
College of New Caledonia	http://www.cnc.bc.ca/
College of the Rockies	http://www.cotr.bc.ca/
Columbia College	http://www.columbiacollege.ca/
Coquitlam College	http://www.coquitlamcollege.com/english/
Corpus Christi College	http://corpuschristi.ca/
Douglas College	http://www.douglas.bc.ca/home.html
Emily Carr University of Art and Design	http://www.ecuad.ca/
Farleigh Dickinson University	http://view.fdu.edu/default.aspx?id=3553
Fraser International College	http://www.fraseric.ca/
Justice Institute of BC	http://www.jibc.ca/
Kwantlen Polytechnic University	http://kwantlen.ca/home.html
Langara College	http://www.langara.bc.ca/
Nicola Valley Institute of Technology	http://www.nvit.ca/default.htm
North Island College	http://www.nic.bc.ca/
Northern Lights College	http://www.nlc.bc.ca/
Northwest Community College	http://www.nwcc.bc.ca/
Okanagan College	http://www.okanagan.bc.ca/site15.aspx
Quest University Canada	http://www.questu.ca/
Royal Roads University	http://www.royalroads.ca/
Selkirk College	http://selkirk.ca/
Simon Fraser University	http://www.sfu.ca/
SFU Continuing Studies	http://www.sfu.ca/cs/
Sprott-Shaw Community College	http://sprottshaw.rtrk.ca/?scid=58284&kw=1054573&pub_cr_id=7326896852
Thompson Rivers University	http://www.tru.ca/
TRU Open Learning	http://www.tru.ca/distance.html
Trinity Western University	http://twu.ca/
University of British Columbia (UBC)	http://www.ubc.ca/
UBC Continuing Studies	http://www.cstudies.ubc.ca/index.html
UBC Distance Education	http://ctl.ubc.ca/distance-learning/

Institution	Home Page
UBC Okanagan	http://web.ubc.ca/okanagan/welcome.html
University of Canada West	http://www.ucan.ca/
University of Northern BC	http://www.unbc.ca/
University of the Fraser Valley	http://www.ufv.ca/home.htm
University of Victoria	http://www.uvic.ca/
Vancouver Community College	http://www.vcc.ca/
Vancouver Island University	http://www.viu.ca/index.asp
Yukon College	http://www.yukoncollege.yk.ca/



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