

SENATE

MEETING DATE: *August 23, 2010*

AGENDA #: *3.4*

PRESENTED BY: *Dana Cserepes*

Issue: Approval of a full program proposal for a Bachelor of Horticulture Science Urban Ecosystems Major, Plant Health Major

For approval: THAT Senate approve the full program proposal for a Bachelor of Horticulture Science Urban Ecosystems Major, Plant Health Major

Full Program Proposal

Bachelor of Horticulture Science
Urban Ecosystems Major
Plant Health Major

School of Horticulture
Faculty of Science and Horticulture

Kwantlen Polytechnic University

August 2010

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Part 1 – Executive Summary

a) An overview of the organization's history, mission and academic goals

Founded as a community college for the South Fraser Region in 1981, subsequently granted university college status in 1995, and university status in 2008, Kwantlen Polytechnic University has provided outstanding undergraduate education for more than twenty-five years. Undergraduate degrees have been offered at Kwantlen since 1996, along with a wide array of diplomas, associate degrees, certificates and citations in different fields of study. The university continues to prepare its students for successful careers as well as helping them develop the skills and critical awareness to be responsible citizens and community leaders. Today, Kwantlen serves approximately 17,500 students each year and is the fourth largest university in British Columbia.

Designated as a “special purpose teaching university”, Kwantlen Polytechnic University was specifically directed to serve the regions encompassing Langley, Surrey, Delta and Richmond. Across its four main campuses, Kwantlen takes up its role as B.C.’s polytechnic university by offering in excess of 130 programs spanning such diverse educational areas as Trades, Vocational, Preparatory, Professional, and Academic. As a leader in innovative education, Kwantlen creates relevant and engaging programs that integrate a broad-based university education, community service opportunities, undergraduate and applied research experience, and essential skills practice. The learning culture at Kwantlen is learner-focused, academically rigorous, innovative, interdisciplinary and socially responsible.

Arising from its commitment to serve the Fraser Region, Kwantlen offers all learners, regardless of background and preparation, and from across the country and abroad, opportunities to achieve the highest standards of academic performance. Access and support services, multiple entry points, and bridging programs are examples of this commitment. Transition programs, international education, workplace experiences and continuing education are also part of Kwantlen’s commitment to lifelong learning across a broad range of educational options.

Our university culture is based on critical inquiry, collegial debate, knowledge generation, freedom of expression, diversity, and environmental stewardship and sustainability.

See the Mission & Mandate document at: <http://www.kwantlen.ca/mission/mission-mandate.html#>.

b) Proposed credential to be awarded, including the level and category of the degree and the specific discipline or field of study

- Bachelor of Horticulture Science major Plant Health
- Bachelor of Horticulture Science major Urban Ecosystems

c) Location

The Bachelor of Horticulture Science program will be offered on Kwantlen's Langley campus.

d) Faculty offering the proposed new degree program

The School of Horticulture, Faculty of Science and Horticulture, will be offering the proposed Bachelor of Horticulture Science (majors Plant Health and Urban Ecosystems) degree.

e) Anticipated start date

The anticipated start date of the program is September 2011.

f) Anticipated completion time in years or semesters

Students engaged in full-time study will be able to complete the Bachelor of Horticulture Science in four years or eight semesters (two cooperative education work experience semesters are optional).

g) A summary of the proposed program

Aims, goals, and or objectives

The Bachelor of Horticulture Science encourages an education environment that promotes analysis, planning, and implementation of sustainable solutions for horticulture and related activities. Lower level courses cover basic horticulture principles and practices, foundational mathematics and science, and fundamental business skills. Upper level courses build on this foundation.

Students studying Urban Ecosystems will assess the urban environment, diagnose problems, develop solutions, install features, and manage sustainable ecosystems on challenging sites. The impact of public perception and policy will be analyzed. Students studying Plant Health will develop the skills required to diagnose plant health problems. Sustainable plant health programs will focus on pests and plant host relationships within the existing ecosystem. Innovative methods of plant health management implemented in other jurisdictions and ecosystems will be assessed for potential use in our local community.

Both of the B. Hort. Sc. majors culminate in a research and enterprise courses. The objective of these capstone courses is to integrate knowledge and skills gained throughout the program and develop a solution to a specific horticulture related problem.

Contribution to mandate and strategic plan

The B. Hort. Sc. Degree supports Kwantlen's Mission and Mandate and strategic planning. The academic rigor of the program, the comprehensive learning outcomes, and the incorporation of essential skills will ensure graduates will be well prepared for employment opportunities.

Learner Focus

- Students in the degree program can customize the emphasis of their education by selection of electives at both the lower and upper levels.

Academic Rigor

- The academic rigor of the program is ensured by the comprehensive learning outcomes and fundamental courses in English, mathematics and sciences which form prerequisites for the upper level curriculum.

Innovation and Creativity

- Course activities in horticulture include theory, laboratory exploration, and practical performance. Functional course websites are used extensively to support learning activities. Case studies and in-depth field studies will be part of the degree program.

Interdisciplinary Approach

- The B. Hort. Sc. degree combines education in horticulture, business, science, and mathematics, and through electives, social science and humanities. Selection of project topics will ensure that students have the opportunity to incorporate other disciplines in their studies.

Social Responsiveness and Stewardship

- Students will embrace the full meaning of sustainability which includes economic, environmental and social factors in all areas of the degree program. The School of Horticulture has been involved in many community initiatives that encompass a sustainability theme. Degree students through class activities will continue this social responsiveness and stewardship focus.

Accessibility

- All horticulture programs in B.C. ladder into the degree program with bridging and upgrading. Qualifying courses are available for the latter. Scheduling of courses in evening time blocks and on Saturdays will increase accessibility for part time students.

Scholarship

- Several faculty members within the School of Horticulture and Institute of Sustainable Horticulture have received outstanding teaching awards.

Mentorship

- The integration of programming within the School of Horticulture allows for lifelong learning opportunities. An extensive network of industry and community contacts will provide access to students for project assignments, work experience and full-time employment opportunities.

Linkages between learning outcomes and the curriculum design (work experience)

The B. Hort. Sc. curriculum was developed using a comprehensive list of learning outcomes that support employment opportunities for graduates. Course progression builds knowledge and skills that will be fully demonstrated at the completion of the program. Work experience, the cooperative educational option, and projects that link to industry or community initiatives will introduce students to prospective employers and areas of employment.

Potential areas of employment/opportunities for further study

Graduates of the B. Hort. Sc. program will enter the environmental employment sector that is predicted to remain strong in Canada and especially in British Columbia. The size of the horticulture industry sector is significant with the total economic contribution to Canada estimated at \$14.5 billion (half direct and half value added). Current trends exemplified by urban agriculture, green roofs, and increased regulation of pest management create gaps in knowledge and skills within the horticulture industry. Additionally, urban heat island effects, storm water management and the interface between urban and agriculture land use are increasing concerns. Graduates will be able to offer and implement solutions that address these issues. Alternatively, graduates will have the opportunity to attend graduate or professional studies programs.

Delivery methods

The B. Hort. Sc. is a selective entry program. Courses will combine theory and application to develop both knowledge and skills. Blended delivery of some sections will improve accessibility of the program for some students. Scheduling of courses will assist students who are only able to engage through a part time education plan. Community involvement will be encouraged when appropriate. International relationships will be explored to create opportunities for students who wish to study abroad. Cooperative education will be optional.

Program strengths

There are five main strengths of the B. Hort. Sc. program:

1. Customized education through the selection of electives that support learner educational goals
2. Laddering within the School of Horticulture programs and articulation with other horticulture programs in BC to support lifelong learning
3. Emphasis on the economic, environmental, and social components of sustainability
4. Strong connections with the horticulture industry and community groups
5. Development of essential skills such as teamwork, creative thinking, problem solving and communication
6. Capstone research courses which include a business plan and the application of new skills to a community based issue

Level of support from other post-secondary institutions/ professional bodies

The Horticulture Articulation Committee held its annual meeting on June 17, 2010. Horticulture programs representatives from across BC attended. There was unanimous support for the B. Hort. Sc. program proposal. The following educational institutions were present at the meeting and voted in favour of the motion of support: Camosun College, Horticulture Centre of the Pacific, HortEducationBC, Thompson Rivers University, University of British Columbia (Botanical Garden), and Vancouver Island University.

BCIT offers programs in environmental protection. In their letter of support (see page 17) Paul Dangerfield, VP of Education, Research and International comments on the strong complementary relationship between their Sustainable Resources Management program and the proposed B. Hort. Sc. program. He suggests that BCIT is open to collaboration with the School of Horticulture in the future.

The BC Landscape and Nursery Association represents a large percentage of the potential employers for Horticulture Technology diploma graduates. Their letter of support (see page 18) states that the B. Hort. Sc. program will fill the demand for more skilled workers with both technical skills and a business background to implement and manage environmentally sensitive practices. The Association states that strengths of our degree program are full laddering for existing horticulture programs and opportunity for co-operative education. BC Greenhouse Growers Association also endorses the proposed degree program, especially the Plant Health major.

Related programs at other BC institutions

The B. Hort. Sc. degree program broadens the scope of traditional agriculture/ horticulture programs by incorporating a sustainability focus. There are several horticulture-related programs offered by BC institutions at the diploma or certificate level. Diploma and degree programs in environmental studies are offered at many institutions. However, the B. Hort. Sc. is the only program that will fully support the horticulture production and urban landscape industries with a comprehensive curriculum.

h) Contact info

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Part 2 – 1.0 Degree Content

1.1 Aims, goals, and objectives

The School of Horticulture has delivered the Horticulture Technology diploma program at the Langley campus for 17 years. The range of faculty expertise, direct application of horticulture principles, and strong ties with industry and the community are the strengths of this program. The Bachelor of Horticulture Science will continue and augment these strengths.

The main theme of the B. Hort. Sc. will be sustainable solutions for horticulture and related activities. The learning outcomes of the degree program balance classroom study and practical application. Students will be encouraged to engage in community activities during their course of study where they will learn to analyze, plan, implement, and maintain horticulture-related crops or landscapes. The study of public policy and public relations will ensure that graduates recognize the varied societal perspectives that impact the horticulture industry and practices.

Learning Outcomes for the B. Hort. Sc. program

Lower Level (common program)

1. Manage plant systems (greenhouse and nursery production, landscape maintenance, or turf and sports field maintenance)
2. Install or construct and maintain facilities that support plant growth (irrigation, environmental control, or landscape/turfgrass features)
3. Develop plant health plans to promote plant growth
4. Apply business skills including finance, communications, and supervision
5. Describe economic principles and issues
6. Demonstrate a breadth of study through general education electives

Upper Level (common program)

1. Practice supervisory and management skills in team environments
2. Communicate effectively with all stakeholders
3. Advocate environmental sustainability within the community
4. Plan, design, and execute enterprise and research projects
5. Examine problems, assess personal beliefs, and draw conclusions using critical thinking

Upper Level – Urban Ecosystems major

1. Assess characteristics of urban environments in relation to horticulture activities
2. Plan and design sustainable plant systems
3. Diagnose problems in horticulture ecosystems and implement sustainable solutions
4. Install and manage sustainable ecosystems in the interface between residential, industrial, agricultural, and natural habitats
5. Monitor and analyze the environmental impact of horticulture systems
6. Interpret, critique, and manage the impact of public policy on the environment within the context of economic, social, and cultural perspectives

7. Facilitate public understanding of and policy development for environmental sustainability

Upper Level – Plant Health major

1. Assess plant/host relationships and monitor the movement and spread of pests
2. Apply analytical skills and diagnose plant health problems
3. Assess the impact of plant health measures on the environment including toxicology
4. Analyze, design, and implement sustainable plant health programs
5. Manage and control plant problems using a variety of tactics
6. Interpret global, social, and economic points of view regarding plant health and pest management
7. Evaluate local, national, and international government regulations, standards, and codes of practice relating to plant health

1.2 Contribution to mandate and strategic plan of institution

Kwantlen became a Polytechnic University in early fall, 2008 and the institution reviewed its mandate in view of its new role. To fulfill the requirements of this new mandate the School of Horticulture is changing its educational profile to include a four year degree program (listed as a Task Force Report initiative in '2008 *Horticulture, A Key to Success for Kwantlen as a Polytechnic University*'). This degree will continue the School's established values of academic rigor with practical application. Upper level courses will analyze and propose sustainable solutions for local community and industry issues, but also within the context of a global society.

The B. Hort. Sc. degree supports Kwantlen's Mission and Mandate through:

Learner Focus

Degree students can customize their learning emphasis in horticulture by their selection of lower level horticulture electives. Project topics in upper level courses will reflect learner interest. Capstone research and enterprise courses are tailored to further support each student's personal interests and career goals.

Academic Rigor

The degree majors are built on the fundamentals of mathematics, chemistry, biology, and horticulture. The academic rigor within these courses and their use as prerequisites for upper level courses balances student access and the knowledge necessary to be successful. The specific learning outcomes of each course and the comprehensive learning outcomes for the full program will ensure program coherence and well educated graduates.

Innovation and Creativity

The faculty within the School of Horticulture employs a number of teaching styles. The partnership between theory and application has always been integral to the School of Horticulture's course offerings. Regular course activities include practical performance of skills at our Field Lab facility, field trips, field studies, and involvement with government, industry, and non-profit agencies. There has been a consensus among faculty that all course offerings be available with a functional course website. To date on-line quizzes, forums, glossaries, voice-over PowerPoint presentations, and short videos have been employed as learning tools within course websites. A School of Horticulture meta-

site is under development. This site will serve as a portal to all HORT course websites. Two courses have been offered in blended learning formats. The degree program will continue this innovative learner focus, as well as build on in-depth field studies through team learning and case studies.

Interdisciplinary Approach

The B. Hort. Sc. degree combines education in horticulture, business, science, and mathematics. Students will have the opportunity to broaden their learning opportunities through electives in social science and humanities. They will also be able to pursue interests that are related to but may be somewhat outside the curricular framework, by selecting a research project that encompasses other disciplines. The Institute of Sustainable Horticulture can provide students with access to research and outreach both locally and internationally.

Social Responsiveness and Stewardship

The underlining theme of the B. Hort. Sc. degree is sustainability. This term is defined in its broadest sense as 'meeting present needs without compromising the ability of future generations to meet their needs'¹. Economic, environmental, and social factors are included in the curriculum and culminate in the capstone case studies course, 'Society and Horticulture'. The fourth year enterprise and research project courses will engage students in industry and community initiatives.

The School of Horticulture has been involved in a number of community-based projects.

Partnership with Douglas Park Community School (2009, on-going)

- Elementary school students participate in the creation and on-going maintenance of an outdoor food systems classroom at the Langley campus Field Lab. This initiative received the BC Landscape and Nursery Association Environmental Stewardship Award for 2009.

'Green Wednesday' community environmental programs (2008 – on-going)

- A series of video presentations and discussions are regularly scheduled at the Langley campus on Wednesday evenings attracting a diverse audience from the community.

Farmers' Market, Langley Campus (summer and fall 2009, on-going)

- A farmers' market was hosted weekly at the Langley campus through the summer and fall months. The organizers and vendors are exploring opportunities to continue this event for 2010.

Salvation Army facility 'Gateway of Hope' (Fall 2009)

- Students enrolled in the landscape and turf option installed a green roof on the new facility built adjacent to the Langley campus.

Campbell Valley Park, Langley (2008 and 2009)

- Students enrolled in the landscape option assisted at the park as part of their course work. Second year students re-designed the visitor centre landscape.

¹ 1987 UN conference

Canadian Food Inspection Agency Workshops (2007, 2008)

- A one-week intensive course was organized for plant inspectors employed by the Canadian Food Inspection Agency. Participants learned to identify pests and plants in the landscape. They also studied methods of scouting for insects and disease as well as regular production practices used in the nursery trades.

Nursery Growers Group IPM on-site Sessions (2007)

- Growers and nursery employees were invited to a different host nursery each month. There were planned speakers and demonstrations as well as informal discussions on a range of sustainable topics concerning methods of pest control.

Green Roof Studies at BCIT (2005 to 2010)

- A Memorandum of Understanding between Kwantlen and BCIT outlines an agreement to identify and explore activities with the Centre for Advancement of Green Roof Technology at BCIT. Faculty and students have been activity involved in this project.

Bug Gardens: Promotion of Integrated Pest Management (2008, ongoing)

- A simple garden template has been designed to include not only beautiful landscape interest for the gardener, but to encourage the attraction and establishment of beneficial arthropods (insects and mites) into the garden to help with pest control. Community groups, visitors, students, and employees at the Langley campus have the opportunity to observe an active 'Bug Garden' located between the East and West buildings.

Accessibility

The School of Horticulture is committed to providing broad access to our students. Some students in our academic department attend part-time. Course sections are scheduled in the late afternoons and evenings as well as Saturdays to accommodate working students. Course websites are used extensively to provide off-campus access to course materials. All horticulture related programs offered at Kwantlen will ladder toward the B. Hort. Sc. degree. However, bridging and academic upgrading may be required to meet the entrance requirement. A flow chart in Appendix 2 outlines the progression of programs available to students.

A separate set of entrance requirements have been maintained for Horticulture Technology diploma applicants. The academic focus of this program will remain at the foundational level coupled with a high level of applied skills. However, upgrading to the entrance requirements of the degree program is reasonable. The upgrade in science, mathematics, and English is necessary to support the learning outcomes of the upper level courses. Students transferring into the degree program will be supported by qualifying courses that are currently available.

Scholarship

Several faculty members within the School of Horticulture and Institute of Sustainable Horticulture have received outstanding teaching awards.

Mentorship

The B. Hort. Sc. degree creates an enhanced opportunity for lifelong learning in horticulture. Horticulture Technology diploma graduates will have access to upper level studies for professional development in the Urban Ecosystems major. Degree students, through the Co-op option and the work experience course, will have access to horticulture related employers and targeted workplace experiences. A job board on the School of Horticulture website has been a popular device with employers posting jobs and with students looking for work. Community or industry partners will be sought to partner with student projects whenever possible.

1.3 Linkages between learning outcomes and the curriculum design (work experience)

The School of Horticulture was conceived in the early 1990's with a purpose to link employment opportunities to learning outcomes and curriculum design. The Bachelor of Horticulture Science curriculum is a comprehensive study of horticultural principles with direct application of those principles. Course progression builds knowledge and skills that will be fully demonstrated at the completion of the program. Lower level courses address the fundamentals of horticulture principles and their application. Mathematics, chemistry, biology, and English, scheduled in year 3, underpin horticulture application to provide a solid foundation for upper level study. Upper level courses include basic classroom and laboratory study at a higher cognitive level, but also focus on more comprehensive applications which include community involvement. The curriculum culminates in a research project which serves to incorporate all of the main learning outcomes in the program.

Essential skills such as problem solving, teamwork, communication, and creative thinking are employed throughout the curriculum, but will be augmented in the capstone courses to ensure that each student is well prepared for employment at graduation. Work experience and the cooperative education option will introduce students to prospective employers and areas of employment. Whenever possible, project topics will link to the industry or community niche in which the student seeks employment.

1.4 Potential areas of employment/opportunities for further study

Agriculture and Environmental Employment Sectors

The B. Hort. Sc. degree combines traditional agriculture/horticulture with the emerging environmental sector. The COPS B.C. Unique Scenario 2007 – 2017 report² predicts that Agriculture sector employment will shrink slightly over this 10 year period by about 0.1%. Most of the job vacancies will be as a result of retirements rather than new job creation. However, this degree focuses more on new areas of employment that can be more correctly captured under the Natural and Applied Science, sub category: Technical Occupations Related to Natural and Applied Sciences. Job opportunities in this occupation skill type are predicted to increase by 1.6% over the next ten years. The broader category of Natural and Applied Science has been ranked in the top three areas to experience employment growth (2.4%).

² COPS B.C. Unique Scenario 2007 – 2017 Ten-Year Employment Outlook for British Columbia

Employment opportunity in the environmental sector is strong. Labour demand for educated employees in this sector is predicted to increase 8.1% by 2011³. This strong demand was not being met by post-secondary graduates up until 2005. However, more recently higher public awareness and student interest in this sector may have alleviated this shortage. A survey of government representatives and post-secondary educators supporting this industry identified several reasons for students making a decision to pursue an environmental career focussed education. A personal interest in environmental issues, strong emotional connection toward the environment and passion about the environment and environmental issues were listed.

Across Canada 20 percent of establishments within the Agriculture, Forestry, Fishing and Hunting industry sector have employees (over 34,000 Canada wide) that focus all or part of their time on environmental issues. About 69 percent of these employees were full-time. "British Columbia has the highest concentration of environmental employment with 4.3 percent of the workforce in this region comprised of environmental employees." *Profile of Canadian Environmental Employment, 2007*⁴

Horticulture Employment Sector

The horticulture industry includes producers of vegetables, fruit, herbs, flowers, shrubs, trees, and turf as well as companies that specialize in landscape design, installation, and maintenance of residential and industrial properties. Management of golf courses and playing fields are included under the horticulture definition. Ornamental horticulture is a sub category of horticulture and primarily focuses on the production and incorporation of non-edible plants into the landscape. However, food crops can be included under ornamental horticulture if produced in small gardens or plots in urban areas and consumed locally.

The ornamental horticulture sector generated \$5.4 billion in farm gate receipts across Canada in 2007. Consumers spent \$1.8 billion on landscape services and \$6.3 billion at the retail level on ornamental horticulture products (2007). Concern for the environment was listed as one of the key trends impacting the ornamental horticulture sector. Green consumerism, pesticide limitations, and urban heat island effect were listed by consumers as concerns. The ornamental sector employs 110,750 full-time equivalent positions across Canada (*The impact of ornamental horticulture on Canada's economy, 2009*⁵). The recession which started in 2008 has decreased employment in the construction sector. However, there has been some renewed activity in 2009. Although anecdotal at this stage, it appears that this recession has not had significant impact on the landscape horticulture in the private sector within the Lower Mainland of BC. Municipalities have curtailed hiring as their revenues are down, but employment opportunities will return as the recession eases. Parks, green spaces, as well as buffer strategies between ecologically sensitive areas and urban use are priorities for many municipalities. The Metro Vancouver Regional Growth Strategy (Draft⁶) supports this movement in the Metro Vancouver Regional Parks and Greenways Plan.

³ *Meeting the demand for trained personnel in Canada's environmental sector.* Canadian Council on Learning. www.ccl-cca.ca/CCL/Reports/ web source Feb. 15, 2010

⁴ ECO Canada, Labour Market Report www.eco.ca Web. June 10, 2009.

⁵ Deloitte & Touche LLP. *The impact of ornamental horticulture on Canada's economy.* Toronto: Canadian Ornamental Horticulture Alliance, 2009. Print.

⁶ Metro Vancouver. *2010 Shaping our Future – Regional Growth Strategy Draft*, November 2009, Metro Vancouver Board.

The size of the ornamental horticulture sector of the economy is significant when all sectors (production, retail, landscape services, and related industries) are included. In 2007 the total economic contribution of the ornamental horticulture sector to Canada was estimated at \$14.48 billion (about half direct output and half value added impacts⁷). This figure was based on multipliers generated by Statistics Canada and includes landscape design and services of \$3.6 billion of which \$1.48 billion and about 43,000 jobs were for landscape service sector. In BC the total economic value of the landscape service sector was estimated at \$138 million and job growth at 11.8%.⁸ The nursery and greenhouse ornamental horticulture production sector generated \$2.22 billion in direct outputs across Canada in 2007 of which BC contributed 24%. For 2008, Statscan⁹ reported farm gate receipts of \$475 million for the BC ornamental production sector. Statistics for 2009 will not be published until June of 2010. However, from anecdotal evidence it appears that there will be little or no growth while the Canadian dollar remains high relative to the US dollar. As the United States re-emerges from recession and the Canadian dollars returns to a more traditional value, the demand for Canadian product will return.

Future trends in ornamental horticulture focus on smaller garden spaces, roof top gardens, and living walls. The public is becoming more concerned about the environment and the impact of the products they buy. Many municipalities across Canada have implemented domestic pesticide restrictions. Alternative methods of pest management in the landscape must be developed. In cities planners are concerned about the heat island effect that increases energy consumption for air conditioning in the summer. Rain water runoff of roofs and overloading of storm water systems is becoming problematic in the Lower Mainland in the winter months. The public and municipalities want landscapes that require minimal maintenance, have a low environmental impact on adjacent natural areas, and have high functional and aesthetic values.

BC Work Futures website lists Landscaping and Grounds Maintenance Contractors and managers (NOC 8255) as above average in future job prospects and almost 700 jobs available over the next five years. Almost half of the employment is concentrated in the Lower Mainland of BC. This number of available jobs represents over five times the capacity of the Urban Ecosystems major per year. We anticipate that the salary of the degree program graduates will be higher than average as these specialized services become more critical to municipalities, school boards, strata associations, and in commercial, industrial, and residential areas. The Nursery and Greenhouse Operators and Managers sector (NOC 8254) lists job prospects as below average with estimates of 450 over the next five years. However, two thirds of the employment is available in the Lower Mainland and the salary prospects are listed as average at \$51, 275.¹⁰ This sector is narrower in scope and somewhat peripheral to the breadth of horticulture topics offered in the B. Hort. Sc. program. We anticipate that our graduates will provide services to this large horticultural sector.

The B. Hort. Sc. in Urban Ecosystems is designed to educate students in the most innovative methods of ornamental plant production, landscape design, and maintenance. Graduates of the degree program will be prepared to work as Urban Horticulturists. Employment with large landscape

⁷ Deloitte & Touche LLP. *The impact of ornamental horticulture on Canada's economy*. Toronto: Canadian Ornamental Horticulture Alliance, 2009. Print.

⁸ Deloitte & Touche LLP. *The impact of ornamental horticulture on Canada's economy*. Toronto: Canadian Ornamental Horticulture Alliance, 2009. Print.

⁹ Statistics Canada. *Greenhouse, Sod and Nursery Industries*, Catalogue no. 22-202-x. Ottawa: Minister of Industry, 2008. Web. Oct. 8, 2009.

¹⁰ Province of British Columbia. *BC Work Futures*. Victoria. Updated July 2009. Web. October 19, 2009

companies, municipalities, and non-profit societies is anticipated. However, many graduates will have acquired the skills to start their own companies and explore entrepreneurial opportunities within ornamental horticulture. The wide range of horticulture topics that can be explored in the Upper Level courses will prepare them for a variety of contractual prospects.

The B. Hort. Sc. in Plant Health will prepare graduates for a variety of employment opportunities with employers that specialize in crop consulting and plant care. The farm gate dollar value of horticultural crops in British Columbia is high with most of the production concentrated in the Lower Mainland and the Okanagan Valley, as well as smaller farms on Vancouver Island. In addition to the \$475 million in ornamental crops farm gate value, there is also \$250 million in fruit crops, \$43 million in field vegetable crops, and \$135 million in greenhouse vegetable crops produced in BC¹¹. Many producers are relying on pest monitoring scouts that search for pest problems and offer advice on pest control strategies. Degree graduates will be prepared to form consulting companies and develop monitoring and crop care plans for many horticultural crops. Suppliers of horticulture related equipment and other goods employ technical sales representatives with horticulture education credentials. Many of these supply companies are international in scope and offer advancement opportunities within their corporate structures.

Government agencies employ graduates with horticulture education. Canadian Food Inspection Agency is anticipating a steady demand for new employees to replace staff as senior officials retire. BC Job Futures website lists 'Plant Protection Inspectors' (sub category of Agriculture & Fish Products Inspectors NOC 2222) as average in job opportunities with an average salary of \$56,397. Several Horticulture Technology diploma graduates have been hired by CFIA as plant inspectors and have been well received. Degree graduates will be qualified to apply for more senior policy positions and will have a greater opportunity for advancement within this large national agency.

Public reaction to pesticide use has resulted in a number of municipalities banning domestic products. This has placed a great deal of pressure on municipal parks boards and private landscape maintenance companies to employ effective, but also sustainable solutions to pest programs. We anticipate that employment opportunities for the Plant Health graduates will be strong as graduates will be trained to diagnose pest problems as well as develop and implement sustainable solutions.

Opportunities for further study

Students will have the opportunity to explore graduate studies or professional development. There are many graduate programs offered at universities across Canada that would provide further study. Graduates will be able to explore areas of interest in land use, government policy and regulation, resource management or integrated pest management.

1.5 Delivery methods

The B. Hort. Sc. degree program will incorporate delivery methods that enhance student success not only in their field of study but also in their choice of employment at graduation. Horticulture courses are traditionally a combination of theory and direct application. Many of the courses have

¹¹ Statistics Canada. *Fruit and Vegetable Production*, Catalogue no. 22-003-x. Ottawa: Minister of Industry, 2008. Web. Oct. 30, 2009.

laboratory components where students acquire skills by performing them. Instruction is delivered on-site whenever possible to ensure correct and direct application of knowledge.

The degree program emphasizes supervisory and management performance, communication skills, interpretation of public policy, analysis and solving of problems, and execution of solutions. Degree students will work regularly in teams as most upper level courses will be project based with emphasis on the implementation of solutions.

Blended Delivery

Many faculty members supplement course delivery with online website activities. The quiz, forum, and glossary functions are used extensively. Two courses have been piloted for blended delivery. The degree program will continue to include features of online instruction to enhance student accessibility to course work and encourage dialogue between students. Blended delivery effectively increases the School of Horticulture's catchment area because students can visit the campus less frequently and still maintain their studies.

Summer Semester

The summer semester may be utilized for specialty courses in the Plant Health major to take advantage of the availability of fresh samples. The three main capstone courses may be scheduled in the summer semester as well to take advantage of the growing season for outdoor research. Scheduled classroom sessions will be held in the late afternoon and evening which will allow for part time study.

Course Scheduling in Late Afternoon, Evening, or Saturday

Sections of the core courses within the Horticulture Technology diploma are scheduled in the late afternoon and evening of the same day to enable part time study. This practice will be continued for the upper level horticultural courses. Saturdays will also be used for part or all of specific courses to allow for attendance at relevant community events.

Integrating with Community Activities

Whenever possible, students will integrate with community activities as part of the course requirements. The School of Horticulture has a long standing commitment with the BC horticulture industry and community groups within Kwantlen's catchment area.

International Studies

The Institute of Sustainable Horticulture is pursuing an international relationship with a University in Cuba. This relationship will potentially provide both educational and research opportunities for students and faculty. A Letter of Intention, which outlines the intention to work towards a full exchange agreement, has been signed. Collaborative research project opportunities are being explored for implementation in the short term.

Kwantlen's International Programs and Exchanges Office and the School of Horticulture are in preliminary discussions with Shandong Agricultural University (SDAU) in China. Students enrolled at this University could have the opportunity to study horticulture at Kwantlen's School of Horticulture when a Memorandum of Understanding is signed. Shandong Agricultural University has over 30,000 students and is experienced in offering innovative international education programming for its

undergraduate students. Currently, SDAU runs joint programs with universities located in Germany and the UK. A general Kwantlen MOU agreement has been drafted and a comparison of horticulture course outlines will be initiated.

Co-operative Education

The degree program will offer optional participation in co-operative education and co-op work semesters. A preparatory course, COOP 1101, a career search course, COOP 2301, and two work semesters or eight months of work experience will be required. In addition to the academic requirements, satisfactory work evaluations must be submitted.

1.6 Program strengths

1. Flexibility of course content allowing customized education for each student and a continual evolution of study topics as the field of sustainability evolves

Students have the opportunity to select from a range of lower level horticulture courses that reflect their area of interest in the first two years of the program. The sequence of foundational mathematics and science courses in combination with upper level horticulture courses is designed to provide a sound academic platform on which a wide variety of sustainable topics can be taught. These topics will change with the evolution of sustainable solutions and project topic student interest. International study options are being explored that can offer students educational opportunities with a global perspective.

2. Continuous laddering of all horticulture programs offered in BC

Students have the opportunity to start in horticulture programs offered at a BC educational institution affiliated with BCCAT (apprenticeship, citation, certificate, or diploma) and ladder to this degree program with a minimum of upgrading and bridging courses to meet entrance requirements. During the last 17 years of instruction within the School of Horticulture, faculty have witnessed the progression of many students enrolled in basic entry level programs to successful graduation from Horticulture Technology diploma programs. Students that wish to continue with their horticulture education will now have a degree program as an option. As an alternative, several upper level courses in the Urban Ecosystems major have been designed to provide professional upgrading for Horticulture Technology diploma graduates.

3. Integration of all sustainability themes

The B. Hort. Sc. degree program emphasises all of the major sustainability themes. Sustainability was originally defined as *'meeting present needs without compromising the ability of future generations to meet their needs'* at a 1987 UN conference, but definitions now commonly include statements relating to economic, environmental, and social factors. The green economy is focused on jobs which contribute to sustainable economic growth, but also minimize pollution, carbon emissions, resource depletion, and ecological degradation¹². The curriculum has been designed to explore many aspects of sustainable horticulture which will contribute to the green economy of BC. Business courses will provide the basics of business practice and communication. Horticulture specialty courses will emphasize sustainable practices and upper

¹² British Columbia's Green Economy. 2010. Globe Foundation, Vancouver BC Web reference www.globe.ca Feb 19, 2010.

level common courses will emphasize social factors. Throughout, students will be encouraged to advocate and practice sustainable strategies.

4. *Strong connections with the horticulture industry and community groups*

School of Horticulture faculty and staff have extensive working relationships with many sectors of the horticulture industry in B.C., across Canada and abroad. Several faculty members also work closely with horticulture related community based organizations. A large network of contacts is readily available to students for project work and employment opportunities. This will allow student teams to partner with industry or community groups on projects of mutual interest. Partnerships will provide students the direct, hands-on experience and a richer level of applied education.

5. *Curriculum emphasis on implementing solutions and essential skills*

Course delivery will emphasize essential skills. Students will work in groups and teams to complete tasks and assignments. In upper level courses students will be assigned as leaders to coordinate their group's activities. These activities could be on the Langley campus or at locations across the Lower Mainland. The latter will involve teams working independently to fulfil the goals of their assignments. Projects will involve written work and oral presentations to colleagues and community guests. Creative thinking and problem solving will be emphasized in the 4000 level courses to ensure that students can analyze problems and produce creative as well as sustainable solutions. Students will not only be able to analyze sustainability issues, but plan and implement practical strategies that will be acceptable to the communities affected.

6. *Capstone research project which includes a business plan and budgeting*

The research project and enterprise project are positioned to become the capstone courses of the B. Hort. Sc. degree. These courses will incorporate knowledge and practice achieved in all other program courses. Student teams will focus on horticulture related sustainability issues. Whenever possible, the team will partner with community agencies. The School of Horticulture has a long history of community partnerships and the Institute for Sustainable Horticulture has many links with agencies in BC, across North America, and abroad. Therefore, students will have a unique opportunity to integrate all of their accumulated skills into a meaningful project that will contribute to society.

1.7 Level of support from other post-secondary institutions/professional bodies



A POLYTECHNIC INSTITUTION

3700 Willingdon Avenue
Burnaby, British Columbia
Canada V5G 3H2
Tel: 604-434-5734
www.bcit.ca

June 24, 2010

Michelle Nakano
Horticulture Instructor, Chair
Landscape and Turf Management Programs
Kwantlen Polytechnic University
12666 - 72nd Ave
Surrey, B.C. V3W 2M8

Dear Ms. Nakano,

Re: Kwantlen Polytechnic University proposal for a Bachelor of Horticulture Science Degree with majors in Urban Ecosystems and Plant Health

On behalf of BCIT, I am writing to confirm our support for your proposed Bachelor of Horticulture Science Degree.

As you are aware, BCIT offers a Sustainable Resource Management diploma program. In addition, we have extensive experience in green roof / living wall research and programming through our Centre for Architectural Ecology. We feel that there would be a strong complimentary relationship between our activities and your proposed new degree. Furthermore, we believe that with the approval of your program there would be a significant opportunity for our two institutions to collaborate in developing courses or formalizing transfer agreements from our diploma into your degree.

We wish you success in your new program.

Sincerely,

A handwritten signature in black ink, appearing to read 'Paul Dangerfield', is written over a faint, larger version of the same signature.

Paul Dangerfield
Vice President of Education, Research and International

cc: Rod Goy, Dean, School of Construction & the Environment, BCIT
Wayne Hand, Associate Dean, School of Construction & the Environment, BCIT



Voice for the BC landscape horticulture industry

May 19, 2010

David Davidson,
Associate Dean
School of Horticulture
Kwantlen Polytechnic University
12666 – 72 Avenue,
Surrey, BC V3W 2M8

Dear David,

Letter of Support for Bachelor of Horticulture Science program

The BC Landscape & Nursery Association (BCLNA) represents over 750 members serving landscape professionals, nursery growers and garden centres throughout BC.

Since its inception in 1953, the BCLNA has worked with industry members, civic, provincial and federal governments to respond to industry, plant health and consumer concerns. This integrated involvement in all aspects of the environmental horticulture industry means that BCLNA is well-placed to understand the emerging trends and challenges within the industry.

According to the January 2009 study – *Impact of Ornamental Horticulture on Canada's Economy*, conducted by Doloitte Touche LLP the average Canadian household spends \$650 per year on horticulture products and services. So, with 1,778,118 households in BC, the industry currently contributes \$1.16 billion to the provincial economy annually.

Changing economic, demographic and land use trends require the horticulture industry to adapt the services it provides to meet the evolving needs of clients and communities. The education and training of people involved across the skill spectrum must also evolve. While various institutions provide a range of educational opportunities to horticulture workers, there are still gaps in the continuum of skills and education of people working in the industry.

We are pleased to offer this letter of support for the proposed B. Hort. Science program with its two areas of focus: Plant Health and Urban Ecosystems. We believe this degree will fill a skills gap and help graduates secure meaningful employment in both the private and public sectors.

- Employers across the industry indicate that there is a lack of qualified skilled workers across all industry sectors, including management.



Voice for the BC landscape horticulture industry

- As the industry becomes more professional in its outlook and business-focus it demands that employees have, or obtain, more post-secondary education to advance.
- The industry still demands strong technical skills.
- The proposed degree is unique in Canada; the combination of theory and practical curricula, including business courses, will provide graduates with a competitive advantage when seeking employment.
- The area of plant health through the application of integrated pest management and environmentally sensitive practices provides an emerging opportunity for employment.
- The increased influx of invasive alien species through importation of plants and food products from around the world demands skilled plant health providers in the urban garden and production facility to mitigate new pest occurrences.
- There is a critical shortage of qualified people who are trained to meet the skill and knowledge levels required for both nursery and landscape certification programs; this demand will only increase in the coming years.

We encourage the faculty to also consider the following points, which may help to strengthen the short and long-term success of the program.

- Enable diploma students and those from articulating programs to enroll immediately (September 2011) in years 3 and 4 in order to capitalize on the pressing employment needs of the industry.
- Aggressively facilitate the articulation and laddering of existing programs (such as Environmental Technician Diploma and other science-based degree programs) to allow Kwantlen to take advantage of its "first entry" position with this unique degree offering.
- Incorporate a "co-op" component to the program to allow prospective employers to work with students. This will assist in faster placement of program graduates and greater industry confidence in the quality of education and training being offered through the new degree program

The BC Landscape & Nursery Association encourages Kwantlen to develop and implement this program in a very expeditious time frame to capitalize on the need for skilled workers in this area. We look forward to continuing our relationship with Kwantlen Polytechnic University to address educations and training requirements for horticulture students in BC

Yours truly,

Bill Hardy, Education Chair



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May 27, 2010

Dr. Carol Barnett
School of Horticulture
Kwantlen Polytechnic University
Langley, BC V3A 8C9

Dear Dr. Barnett:

This letter is in support of the proposed Bachelor of Horticulture Science major Plant Health by Kwantlen Polytechnic University, School of Horticulture.

The BC Greenhouse Growers' Association represents growers who produce 96 percent of all of BC's greenhouse vegetables. The sector generates \$200 million in sales, accounting for 10% of BC's annual farm gate sales, and employs more than 3,200 people. Our crop production systems use sophisticated state-of-the-art technology from computer monitoring and climate control to precision hydroponics.

We rely on well educated and experienced technical assistants, assistant growers and growers to manage our complex production systems and thus we support the proposed Bachelor of Horticulture Science major Plant Health.

Yours truly,

Mary-Margaret Gaye, M. Sc., P. Ag.
Executive Director
BC Greenhouse Growers' Association

Horticulture Articulation Committee, June 17, 2010

The Horticulture Articulation Committee met on June 17 at the UBC Botanical Garden, Vancouver. The Bachelor of Horticulture Science program and majors, Plant Health and Urban Ecosystems, were presented to the committee. There was unanimous support from all of the representatives attending. The practical skills, laddering opportunities for any horticulture student in the province, and the reasonable entrance requirements were noted as being strengths of this program.

Horticulture Representative(s)	Educational Institution
Dale Toronitz	Camosun College
Roger Charles	Horticulture Centre of the Pacific
Anne Kadwell	HortEducationBC (HEBC)
Ernest Phillips & Kevin Scollon	Thompson Rivers University
Douglas Justice	University of British Columbia (Botanical Garden)
Laura-Jean Kelly	Vancouver Island University

1.8 Related programs at other BC institutions

The B. Hort. Sc. degree program is designed to broaden the scope of traditional agriculture/horticulture education by incorporating a sustainability focus. Student enrolment in agriculture programs offered at colleges/institutes and regional universities in B.C. decreased by 25% from 2006/07 to 2008/09. During the same time period, student enrolment in Natural Resources and Conservations programs increased by 12%. The same trend occurred at research universities where the number of credentials awarded to students in Agriculture programs decreased by 6% and increased by 11%¹³ in Natural Resources and Conservation programs. The Bachelor of Horticulture Science combines traditional horticulture with the study of environmental and conservation topics. This combination provides student proficiency in essential horticulture skills and a critical understanding of related sustainability issues which will meet current and future employment requirements.

Many of the colleges and universities in BC deliver programming in environmental studies¹⁴. Often these programs focus on natural resources and forestry. Plant protection courses such as plant pathology, entomology, and weed science also centre on forestry and natural sites or are offered as electives in the field of Biology. Kwantlen's B. Hort. Sc. program fully supports the horticulture production and urban landscape industries with a comprehensive set of courses. These differences set our program apart and provide graduates with skills to work in peri-urban and urban environments.

Table 1 lists horticulture-related educational programs that are offered by other institutions in BC at the certificate, diploma, or degree level. There are transfer agreements in place that allow graduates from the certificate programs to ladder into the Horticulture Technology diploma at Kwantlen. Diploma

¹³ *Bachelor of Horticulture Science Degree Proposal Review Report*. Office of Institutional Analysis & Planning, Kwantlen Polytechnic University, Feb. 2010.

¹⁴ *Bachelor of Horticulture Science Degree Proposal Review Report*. Office of Institutional Analysis & Planning, Kwantlen Polytechnic University, Feb. 2010.

graduates can enter into the Urban Ecosystem major or the Plant Health major with the appropriate upgrading in English, chemistry, and mathematics.

Table 1

Educational Institution	Program Name	Program
Camosun College	Horticulture Technician (Trades Foundation)	Certificate
Thompson Rivers University	Diploma in Horticulture & Management (academic program)	Diploma
Thompson Rivers University	Horticulture Certificate (Trades Foundation)	Certificate
University of the Fraser Valley	Horticulture Crop Production & Protection (academic program)	Certificate
Vancouver Island University	Horticulture Therapy Diploma (academic program)	Diploma
Vancouver Island University	Horticulture Technician (Trades Foundation)	Certificate
University of British Columbia	BSc in Applied Biology	Degree
University of British Columbia	BSc in Global Resource Systems	Degree

2.0 Curriculum Design

a) Required courses

Years 1 and 2 required courses

All courses listed below are existing courses except where designated with '(new)'

BUSI 1205	Supervisory Skills, Business Management
BUSI 1209	Business Management in Horticulture
CBSY 1105	Introductory Microcomputer Applications
CMNS 1140	Introduction to Professional Communication
HORT 1102	Botany for Horticulture
HORT 1104	Soils, Soil Amendments and Soilless Media
HORT 1110	Introduction to Sustainable Horticulture
HORT 1155	Intro to Plant Identification
HORT 1217	Introduction to Pest Management
HORT 2300	Horticultural Work Experience

Plus one of:

HORT 2308	Landscape IPM
HORT 2333	Turfgrass Pest Management
HORT 2378	Greenhouse and Nursery Pests

Plus 2 of general education courses (6 CR)

Plus 24 credits (9 credits at the 2000 level) selected from the following list:

HORT 1116	Introductory Equipment Maintenance
HORT 1122	Introduction to Landscape Practices
HORT 1134	Turf Maintenance Operations
HORT 1171	Production Practices - Fall
HORT 1224	Landscape Drafting

HORT 1230	Sustainable Turf Management
HORT 1240	Arboriculture I
HORT 1246	Plant ID for Production
HORT 1255	Plant Identification II
HORT 1261	Plant Propagation
HORT 1271	Production Practices - Spring
HORT 2304	Grounds Machinery
HORT 2320	Landscape Design I
HORT 2330	Turfgrass and Environmental Stress
HORT 2334	Irrigation, Drainage, and Lighting
HORT 2335	Sports Turf Management Practices
HORT 2355	Plant Identification III
HORT 2371	Fall Floriculture
HORT 2372	Greenhouse Vegetable Production
HORT 2375	Production Facilities and Equipment
HORT 2412	Landscape Estimating and Contract Administration
HORT 2420	Landscape Design II
HORT 2426	Landscape Construction
HORT 2436	Golf Course Management
HORT 2437	Golf Course Irrigation Systems: Design and Operations
HORT 2442	Arboriculture II
HORT 2463	Nursery Production
HORT 2472	Forestry Crop Production
HORT 2473	Greenhouse Environments
HORT 2477	Production Horticulture Management
HORT 2479	Spring Floriculture
HORT 2490	Organic Greenhouse Crop Production

Years 3 and 4 required courses

Lower Level

BIOL 1110	Introductory Biology I
ENVI 1106	Environmental Chemistry
MATH 1117	Environmental Mathematics
ENGL 1100	Reading, Writing and Thinking: An Introduction

Plus 3 credits general education elective

Upper Level

HORT 4xxx	Vegetation Management (new)
HORT 4xxx	Society and Horticulture (new)
HORT 4xxx	Enterprise Project (new)
HORT 4xxx	Research Project (new)
PHIL 3033	Business Ethics (general education)

Plus 3 credits upper level writing intensive elective

Urban Ecosystems Major

HORT 3xxx	Communities and Horticulture (new)
HORT 3xxx	Water Resources (new)
HORT 3xxx	Sustainable Production (new)
HORT 3xxx	Inventory of Plant Communities (new)
HORT 3xxx	Landscape and the Environment – Theory (new)
HORT 4xxx	Landscape and the Environment – Applications (new)
HORT 4xxx	Riparian Management (new)
HORT 4xxx	Landscape Management (new)

Plant Health major

BIOL 1210	Introductory Biology II
MATH 1115	Statistics I
HORT 3xxx	Entomology (new*)
HORT 3xxx	Plant Pathology (new*)
HORT 3xxx	Integrated Pest Management (new*)
HORT 4xxx	Environmental Effects of Plant Health Practices (new*)
HORT 3xxx	Biological Pest Management (new*)
HORT 4xxx	Scouting, Monitoring and Assessment (new*)
HORT 4xxx	National and Global Regulatory Issues in Plant Health (new*)

COURSE PROFILE SUMMARY:

Urban Ecosystem major

79 lower level credits

42 upper level credits (24 in major)

HORT credits 80 (44 lower level + 36 upper level)

Science/math	11 (ENVI, MATH and BIOL)
Business	12 (CMNS, CBSY, BUSI)
Writing Intensive	6 (ENGL, elective)
Ethics	3 (PHIL)
General Ed	<u>9</u> electives
TOTAL	121

Plant Health major

86 lower level credits

39 upper level credits (21 in major)

HORT credits 77 (44 lower level, 33 upper level)

Science/math	18 (ENVI, MATH and BIOL)
Business	12 (CMSN, CBSY, BUSI)
Writing Intensive	6 (ENGL, elective)
Ethics	3 (PHIL)
General Ed	<u>9</u> electives
TOTAL	125

b) Courses/calendar description/prerequisites (appendix)

See Appendix 1 Course Descriptions.

2.1 Program Delivery

The main learning methodologies directing content delivery will be active or experiential learning with a team-work orientation. Students will be organized in teams to complete assignments and project work when appropriate. The majority of upper level courses will be split between classroom and laboratory work (science laboratory or Field Lab facility). These learning methodologies will continue the traditional learner focus used in the School of Horticulture. Faculty have delivered courses using a combination of classroom (theory) and laboratory (applied) since the inception of the Horticulture Technology diploma program in 1993. A major strength of the diploma program is the 'hand's on' nature of instruction, which results in job-ready skills for graduates.

Upper level courses will encompass a comprehensive list of cognitive, affective, and psychomotor learning outcomes. The course outlines will further expand on the program learning outcomes to ensure that students attain a full range of skills that will enhance their success. (See Degree Content, page 7)

Students in the degree program will have the opportunity to select a variety of lower level horticulture course electives. Additionally, graduates from the Environmental Protection Technology program, who have a different set of skills and background knowledge, can enter Year 3 with bridging. The diversity of interests and proficiencies can be used to advantage when assigning teams and project topics.

Upper level courses in both majors are organized to progressively build on knowledge and skills. Assigned tasks will have an additional level of complexity as students move through the program. The program will culminate in the faculty supervised and student-centred research and enterprise projects.

Essential Skills will be incorporated into the degree program.

Creative Thinking and Problem Solving Skills

Students will be introduced to creative thinking strategies to overcome sustainable horticulture challenges. Some horticulture practices are no longer sustainable or provide appropriate solutions to horticultural based problems. Students will complete an in-depth analysis and use creative thinking to develop specific as well as broad solutions. Solutions will be implemented and evaluated using sustainable criteria. Faculty will involve community exchange at each step of this process whenever possible.

Oral Skills

Oral skills will be taught and evaluated. Students will be expected to work effectively in laboratory sessions and project work during and outside of the class schedule. Interaction with community organizations will be strongly encouraged within upper level courses. Capstone common courses will require oral presentations. Audiences may be within the School of Horticulture or, preferably if projects are related to community groups, at community meetings.

Interpersonal Skills/Teamwork and Leadership Skills

Acquisition of team work skills is paramount for successful program completion. Students will be placed in teams for many assignments. Division of tasks within the team, participation in preparation of materials, collection of data and/or construction of the project, and final presentation of the assigned work will be part of the requirements for successful completion of the course.

Personal Management & Entrepreneurial Skills

Many students may consider starting their own business or working as managers within government agencies or non-governmental organizations. This degree program is organized to ensure success as an entrepreneur or a manager. Two business courses and the enterprise project capstone course will deliver the essentials of budgeting and financial reporting. The flexibility of topic focus when selecting lower level horticulture electives and the choice of project topics and community networking in upper level courses will provide each student with the means to guide their career toward a business or management career.

Writing Skills

Many of the upper level courses will require written project reports. Industry relevant reporting formats will be employed whenever possible. Synthesis of information will be demonstrated by students enrolled in the common capstone courses.

Reading and Information Skills

Researching a wide range of information sources which may include government, academic, and popular publications will be part of each major project assignment. Students will need to find, analyze, and summarize this information.

Visual Literacy

The Urban Ecosystems and Plant Health majors require a high level of visual literacy. Graphs, models, site plans, and other methods of assembling data will be extensively used.

Mathematical Skills

Environmental Mathematics ENVI 1117 will prepare students for the mathematics required to successfully complete upper level courses. For example, students will be required to assemble pest count data in a graphic format in the Plant Health major. Students will use mathematics when planning and installing landscape features in the Urban Ecosystems major.

Intercultural Skills

The School of Horticulture involves all students regardless of gender, age, or background. Innovative instructional techniques are planned for the upper level courses of the degree program which will accommodate a variety of interests, background knowledge, and applied skills. Collaborative project work will encourage students to work together toward a common goal. The common fourth year course, Society and Horticulture, will discuss cultural perceptions of horticultural activities. These will not only involve variations in horticulture application around the world, but also the differences that exist between urban and rural settings. Students at the upper level will interact with community representatives whenever possible to enhance their intercultural skills.

2.2 Admission Requirements

Year 1 Degree Program Entry Requirements

In addition to the University entrance requirements, students entering the degree program at Year 1 will need to meet the following program requirements:

- English 12 with a B¹⁵ or equivalent
- Principles of Math 11 with a C or equivalent
- Chemistry 11 with a C+ or equivalent
- Biology 11 or 12 strongly recommended

Year 3 Program Entry or Continuance Requirements

Students entering the degree program at Year 3 will need to meet the following entry requirements:

- Horticulture Technology diploma¹⁶ or equivalent with a PGPA of 2.5
- English 12 with a B or equivalent (writing the Kwantlen Polytechnic University English Placement Test is recommended if a candidate cannot meet the required minimum letter grade).
- Chemistry 11 with a C+ or equivalent
- General Education 6 credits
- HORT 1110 Introduction to Sustainable Horticulture (3 credits)
- Biology 11 or 12 strongly recommended

See Appendix 2 for a program flow chart.

¹⁵ The requirement is based on ENGL 1100.

¹⁶ Principles of Math 11 with a C is a requirement of the Horticulture Technology diploma program at Kwantlen. Students entering the degree program at Year 3 with an equivalent diploma would also require an equivalent level of mathematics.

2.3 Faculty

List the faculty and their areas of specialization

Barnett, Carol

Education: P.I.D. (Ministry of Adv. Ed.), B.Sc. Agr. (Guelph), M.Sc. (Guelph), Ph.D. (Cornell) P.Ag. (B.C.I.A.)

Areas of specialization: Horticultural Botany, Growing Media, Plant Propagation, Nursery Production

Burns, Patrick

Education: B.A.A.D.E. (UFV), Dip. Landscape/Horticulture (Olds), P.I.D. (Ministry of Adv. Ed.), Journeyman Horticulturist (B.C.)

Areas of specialization: Plant Identification, Irrigation and Drainage Design and Installation, Landscape Installation

Cunnin, Elizabeth

Education: Cert. Landscape Hort. App. (Kwantlen), Cert. Qualification (B.C.), B.A. (S.F.U.), M.Ed. (S.F.U.), Cert. Hort. Tech. (C.N.L.A.)

Areas of specialization: Plant Identification, Landscape Design, Landscape Estimating, Arboriculture

Davidson, David

Education: B.Sc. Agr. (U.B.C.), M.Sc. (Guelph)

Areas of specialization: Soil Science, Turfgrass Science and Management

Giardini, Renee

Education: P.I.D. (Vancouver), B.Sc. (U.B.C.), M.Sc. (U.B.C.)

Areas of specialization: Soil Science

Jones, Gary

Education: P.I.D. (Vancouver), B.Sc. (Nott.), M.Sc. (C.I.T.), P.Ag. (B.C.I.A.), M.I. Hort (IoH)

Areas of specialization: Greenhouse Pest Management, Greenhouse Vegetable Production (traditional and organic methods), Greenhouse Structures

Kazymerchuk, Stanley

Education: P.I.D. (Ministry of Adv. Ed.), Cert. Pesticide Applicator (B.C. Ministry of Env.), B.Sc. (Ore.)

Areas of specialization: Turfgrass Management

Marchuk, Ron

Education: P.I.D. (B.C.), Cert. Hort. (Alta), B.A. (Hons) (Qu.)

Areas of specialization: Floriculture Production and Greenhouse Management

Matteoni, James

Education: Cert. Integrated Pest & Disease Mgt. (Wageningen), Cert. Mycoplasma (Bordeaux II), B.Sc. (Elmhurst), M.Sc. (Ill.), Ph.D. (Cornell)

Areas of specialization: Horticultural Botany, Pest Management, Entomology, Plant Pathology

McTavish, Bruce

Education: B.Sc. (S.F.U.), M.Sc. (U.B.C.), M.B.A. (S.F.U.), P.Ag. (B.C.I.A.), R.P.Bio. (A.P.B.), C.A.C. (C.C.A.A.), Journeyman Horticulturist (B.C.)

Areas of specialization: Soil Science, Horticultural Business Practices, Nursery Production, Plant Health Certification Systems, International Trade

Mullinix, M. Kent

Education: B.Sc. (Missouri), M.S. (Missouri), Ph.D. (U.B.C.), Ph.D. (Missouri)

Areas of specialization: Sustainable Agriculture, Fruit Production

Murray, Susan

Education: B.Sc.Agr. (U.B.C.), M.Sc. (U.B.C.) Board Certified Master Arborist (I.S.A.), P.Ag. (B.C.I.A.)

Areas of specialization: Plant Identification, Arboriculture, Landscape Estimating, Landscape Design

Nakano, Michelle

Education: Dip. Landscape/Horticulture (B.C.I.T.), P.I.D. (Vancouver), B.A. (U. Fraser Valley)

Areas of specialization: Plant Identification, Landscape Design, Landscape Installation, Landscape Maintenance

Puddicombe, Anthony

Education: P.I.D. (Vancouver), Cert. Hort. Landscape Tech. (B.C.I.T.), Journeyman Horticulturist (Apprenticeship Board), Cert. Arborist (I.S.A.)

Areas of specialization: Plant Identification, Landscape Installation, Landscape Maintenance, Arboriculture

Regan, Daniel

Education: Cert. Outdoor Power Equip. T.Q. (Min. Labour)

Areas of specialization: Horticulture Equipment

See Appendix 4 for a summarized curriculum vitae for each faculty member.

3.0 Program Resources

a) Resources that will be required

Library

The library has an extensive collection of references and materials for the Horticulture Technology diploma program that will also support the B. Hort. Sci. Major in Plant Health and the Major in Urban Ecosystems. Recent acquisitions have greatly enhanced the collection. The library has joined the Canadian Knowledge Network which will provide access to the Science Citation Index and the Science Direct database. Further acquisitions will be made before the launch of the degree program.

Computer and Computer Access

The HORT 3xxx Landscape & the Environment – Theory course will require a computer classroom with drafting/design software. The laboratory which stages demonstrations and analytical materials to support Plant Health major courses will require one computer with a data projector connection and internet access. Student will be required to research pest problems using internet information sites.

Classrooms, Laboratories, and Equipment

The Horticulture Technology program has laboratories and a Field Lab facilities which will be shared when the degree program is launched. However, equipment, science laboratory space, and Field Lab plantings will need to be augmented for the B. Hort. Sci. Program. A detailed list will be developed for the budgeting process.

Existing and Shared Resources at the Institution or Other Institutions

The Field Lab facility at the Langley campus will be fully utilized by students in all programs offered by the School of Horticulture. Each science laboratory will accommodate courses at all levels that have a common theme.

Additional Resources

Additional storage space for collections and other materials supporting the curriculum will be required.

b) Provide the intended implementation schedule for the new program and evidence of the appropriateness of the schedule

The initial intake of students for this program is scheduled for September 2011. Year 1 and Year 2 courses run parallel with the Horticulture Technology diploma. Curriculum and facilities are in place. Science laboratory renovations at the Langley campus will be complete by Fall 2011 in preparation for Year 3 courses which will commence in September 2013.

4.0 Program Consultation

a) List and explanation of consultations

School of Horticulture faculty and staff solicited feedback from the following individuals regarding the learning outcomes of the Urban Ecosystems major. Comments can be read in Appendix 3 of this document. The learning outcomes were amended to include recommended changes for the final version of the Concept and the Full Program Proposal.

Industry Representatives

Cary Van Zanten, President, Canadian Nursery and Landscape Association

Richard Desmarteau, Fairfield Tree Nurseries Inc.

Colin Cruickshank, Business Manager, Bylands Nurseries Ltd.

Amanda Jarrett, Amanda's Garden Consulting Company

Paul LeBlanc, Biological Systems Specialist, Koppert Canada (Graduate, Horticulture Technology Program)

Government/Institutional Representatives

Kerly Ascosta, Centre for Architectural Ecology BCIT

David Woodske, Manager, Horticulture Unit, BC Ministry of Agriculture and Lands

Sarah Pong, Canadian Food Inspection Agency (Graduate, Horticulture Technology Program)

Gail Szostek, Environmental Planner, Parks and Leisure Services, District of Maple Ridge

Trisha McCarthy, Horticulture Supervisor, District of North Vancouver (Graduate, Horticulture Apprenticeship Program)

Graduates of Horticulture Technology Program:

Charissa Pals

Geina Fournier

Faculty and staff are very active in horticulture related community, industry and government, local, provincial, and national, and international organizations. Members of the School of Horticulture hold memberships and regularly attend meetings, serve on committees and participate in other activities in the following organizations:

- BC Association for Regenerative Agriculture, Organic Group (Certification Committee)
- BC Greenhouse Growers Association (Industry Development Committee)
- BC Landscape and Nursery Association (Growers Group)
- BC Landscape and Nursery Association (Landscape Group)
- BC Plant Protection Advisory Council
- Canadian Nursery and Landscape Association
- Certified Organic Association of BC
- International Plant Propagators' Society Western Region
- Langley Community Farmers Market Society

- North America Plant Protection Organization
- Professional Pest Management Association of BC
- Vancouver 1st Strathcona Community Gardens
- Vancouver Youth Alliance
- Western Canada Turfgrass Association

b) written comments

See Appendix 3: Feedback from Industry, Government, and Students

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Appendix 1: Course Descriptions

BIOL 1110 CR-4

Introductory Biology I

Students will study the diversity of life on Earth, the classification of organisms, and the interactions of organisms with their environments. They will examine the structure and function of body systems in a variety of organisms.

Transferable (refer to [transfer guide](#))

BIOL 1210 CR-4

Introductory Biology II

Students will study concepts of inheritance and biological evolution. They will examine the major classes of biological chemicals, the structure and function of cells, and the processes of cellular respiration and photosynthesis. They will study the patterns and mechanisms of embryological development.

Prerequisites: BIOL 1110

BUSI 1205 CR-3

Supervisory Skills

This course is designed for students in programs other than business management. It is primarily intended for students in the Horticulture Technology program, but it may also be of interest to students in other disciplines who are preparing for supervisory positions in various fields. The role of supervisor is presented within the framework of the four functions of management: planning, organizing, leading and controlling. Students will be introduced to contemporary supervision techniques, participative leadership and team concepts which can be applied at the supervisory level.

BUSI 1209 CR-3

Business Management in Horticulture

Students in Horticulture will learn the basic concepts of business management needed to be successful in the industry, including: budgeting, cash flow management, working with financial statements, basic banking procedures and dealing with financial institutions. The students also learn basic record keeping and inventory management. Key government regulation affecting horticulture businesses and management of risk in British Columbia will also be covered.

CMNS 1140 CR-3

Introduction to Professional Communication

Students will learn how to analyze context and audience, determine purpose, message content, visual design and media in order to create written workplace messages that can be received, understood, used and retrieved with speed and accuracy.

Prerequisites (LPI 26) or TPC12 (C+) or English 12 (C+) or ABEE 0091 or PSPE 1091 or CMNS 1110 or ENGL 1099 or CMNS 1105 or Kwantlen English Placement Test or ABEE 0097 or PSPE 1097 or [ELST 0381 (B) and 0383 (B)]

CBSY 1105 CR-3

Introductory Microcomputer Applications

Students will examine basic computer hardware and software concepts, and the Internet. They will use the Windows operating system, spreadsheet software, presentation software and word processing software to develop solutions for business problems. The current software in use is Microsoft Windows® and Microsoft Office®.

ENGL 1100 CR-3***Writing, Reading and Thinking: An Introduction***

Students will learn to apply principles of rhetoric and critical analysis in response to selected readings, which will include examples of scholarly writing and academic argument. They will develop their writing skills through exploratory writing, academic argument, and critical analyses of material from a variety of contexts.

Prerequisites: English 12 (B) or ENGQ 1099 or ABEE 0091 or ENGP 1091 or ABEE 0092 or ABEE 0097 or ENGP 1097 or Kwantlen English Placement Test or an LPI Essay score of 30 – Level 5 or (ELST 0381 & 0383 (B))

ENVI 1106 CR-4***Environmental Chemistry I***

Students will study chemistry with a focus on environmental issues and applications. They will study concentration units, volumetric and gravimetric analysis, gases and organic chemistry with applications relevant to environmental issues.

Prerequisites: (CHEQ 1094 or Chemistry 11 [C+] or Chemistry 12 [P] and (MATQ 1093 or ABEM 0011 or MATP 1011 or PSPM 1082 or Principles of Mathematics 11)

Corequisites: MATH 1117

MATH 1115 CR-3***Statistics I***

Students will summarize and display data and perform inferences about proportions, means and standard deviations for one and two populations. They will also perform regression analysis, and determine probabilities.

Prerequisites: MATQ 1093 or MATH 1117 or (ABEM 0011 or MATP 1011 or MATQ 1099 with a B-); or Principles of Mathematics 12 with a C; or Principles of Mathematics 11 with a B; or Principles of Mathematics 11 with a C plus Mathematics Placement or Principles of Mathematics 12 with a P plus Mathematics Placement Test; or Applications of Mathematics 12 with a C plus Mathematics Placement Test; or Applications of Mathematics 11 with a C plus Mathematics Placement Test

MATH 1117 CR-3***Environmental Mathematics***

Students will study algebraic concepts and methods, making use of them in general and environmental problem solving. They will study basic geometry and trigonometry, as well as functions (polynomial, rational, exponential, and logarithmic).

Prerequisites: MATH 1092 or ABEM 0072 or PSPM 1072 or MATP 1010 or ABEM 0010; or Principles of Mathematics 12 with a P; or Principles of Mathematics 11 with a C; or Applications of Mathematics 12 with a C; or Mathematics Placement Test

PHIL 3033 CR-3 (formerly ENTR 3033)***Business Ethics***

Students will study various ethical and meta-ethical theories, and will apply them in standard business contexts, such as employer-employee relations, risk analysis, occupational and product safety, environmental protection, and multinational practices. Students will acquire the tools to allow them to make ethical business decisions.

HORT 1102 CR-3***Botany for Horticulture***

Students study the morphology, anatomy, physiology, and reproduction of cone-bearing and flowering plants. They will apply appropriate plant taxonomy and nomenclature to the major plant families used in commercial horticulture. Students will discuss evolution and plant ecology to challenge some current horticultural practices. They will work with fresh and preserved plant material to provide an understanding of current horticultural practices, and will demonstrate different aspects of plant physiology in the laboratory.

HORT 1104 CR-3***Soils, Soil Amendments & Soilless Media: An Introduction***

Students will study soil and soilless media, taking into consideration soil formation, physical, biological, and chemical properties of soil, fertilizer use and behaviour, soil amendments and soil test result analysis.

Prerequisites: Principles of Math 11 or Applications of Math 11 or HRTA 0096 or HORT 1094 or ABEM 0011 or MATQ 1099 or MATQ 1093 or Kwantlen's Horticulture/Mathematics placement test.

HORT 1110 CR-3***Introduction to Sustainable Horticulture***

Students will consider horticulture within a social context and social responsibility, exploring the inter-relatedness between environment, society, and economy. They will differentiate between conventional and sustainable practices in different horticultural disciplines: greenhouse production, nursery, turf, and landscape. Students will study the core issues of water use, soil management, energy consumption, air quality/pollution, and land use. They will employ critical thinking to analyze the underlying topics of urban land planning, crop diversity, genetic modification, and bioproducts/bioprocessing. Students will investigate sustainability within a frame work of the history of agriculture and horticulture, food and amenity systems within ecology, and the rise of organic cultivation.

HORT 1116 CR-2***Introductory Equipment Maintenance***

Students will be introduced to basic machinery and mechanical systems used in horticulture. They will perform preventative maintenance and troubleshooting procedures on horticulture equipment. Safe work practices will be covered.

HORT 1119 CR-3***Landscape and the Environment I***

Students will examine social, ecological, and economic principles of sustainability within the context of residential landscapes. They will relate natural processes, human values, and technology in a systems approach to landscape planning, installation, and maintenance that mitigates environmental degradation. Students will examine practical adaptive landscape strategies including biodiversity, green roofs, and absorptive landscapes.

HORT 1122 CR-2***Introduction to Landscape Practices***

Students will be introduced to the scope and breadth of the landscape industry. They will study basic landscape installation and maintenance including concrete structures, pathways, and plant material. Students will also practise basic landscaping equipment operations. They will be required to complete individual work practice sessions outside of formal class time.

HORT 1134 CR-2***Turf Maintenance Operations***

Students will perform work on the School of Horticulture golf course and grounds to gain practical experience in turf maintenance. They will engage in tasks including reel, rotary, flail mowing, core cultivation, topdressing, seeding, sodding, sand trap maintenance, and other tasks as required to maintain a variety of turf operations. Students will be required to complete individual work practice sessions outside of formal class time.

HORT 1155 CR-3***Intro to Plant Identification***

Students will practise skills that will enable them to identify a wide range of plants used in all segments of horticulture including examples of trees, shrubs, vines, groundcovers, perennials, annuals, house plants, and cut flowers. They will study the important characteristics of leaves, flowers fruits, plant shapes, and branching patterns, and will learn about growing requirements and plant use and availability.

HORT 1171 CR-2***Production Practices - Fall***

Students will study essential horticultural principles and will work in School of Horticulture and commercial greenhouse facilities to gain experience in basic horticultural labour and equipment operations. They will maintain and harvest fall season crops, such as poinsettias, chrysanthemums, cut flowers, potted plants, greenhouse vegetables, and forestry crops. Students will be required to complete individual work practice sessions outside of formal class time.

NOTE: Fieldtrips to commercial operations are an integral part of this course.

HORT 1217 CR-3***Introduction to Pest Management***

Students will study the morphology, physiology, and habits of pests (including insects, mites, and vertebrates) to select a combination of cultural, chemical, physical, and biological control methods. They will work with diseases and disorders of plants, and will demonstrate concepts of the spread of disease. Students will handle weed specimens to identify and choose appropriate control measures. They will discuss the tenets of integrated pest management and relate them to commercial horticultural situations, and will learn the safe and effective use of 25 kg-backpack and/or canister sprayers.

Prerequisites: Principles of Math 11 or Applications of Math 11 or HRTA 0096 or HORT 1094 or ABEM 0082 or ABEM 0011 or PSPM 1082 or MATP 1011 or MATH 1093 or Kwantlen's Horticulture/Mathematics placement test.

Corequisites: HORT 1101

HORT 1223 CR-2***Basic Landscape Operations***

Students will practice the basic skills and techniques for surveying and installing landscapes. They will study print reading and construction techniques and will learn about landscape construction materials.

HORT 1224 CR-3 (formerly 1220)***Landscape Drafting***

Students will study basic drafting techniques and standards. They will also practise drafting skills through a series of manual and computer assisted drafting exercises. Students will practise the proper use of drafting tools, techniques, and a computer assisted design program.

HORT 1230 CR-3***Sustainable Turf Management***

Students will study and apply principles for the establishment and maintenance of sustainable turf. They will select and apply fertilizers, compost materials, and other amendments. Students will develop cultural programs for the low maintenance lawns, lawns in sustainable landscapes, and organic lawns. They will review and discuss current issues affecting the function, use, and maintenance of turf in modern society. Students will be introduced to the management of athletic fields and golf courses.

HORT 1240 CR-3***Arboriculture I***

Students will study the relationships between plant function and plant form and structure. They will gain practical experience, as weather permits, in pruning a wide range of trees and shrubs using hand pruning tools, power hedge trimmers, and a chipper

Prerequisites: HORT 1155 or 1145 or HRTA 1125

HORT 1246 CR-1.5***Plant ID for Production***

Students will practise the identification of plant species produced in commercial greenhouses and nurseries in varying stages of growth. They will also learn about the use of plants, their growing seasons, and their market value.

Prerequisites: HORT 1155 or 1145 or 1125 or HRTA 1125

HORT 1255 CR-1.5***Plant Identification 2***

Students will enhance their plant identification skills learned in HORT 1155 through field identification of trees, ground covers, vines and other plants. They will discuss each plant with respect to shape, branching patterns, flower, leaf and fruit characteristics, growing requirements and use in the landscape.

Prerequisites: HORT 1155

HORT 1261 CR-3***Plant Propagation***

Students will discuss the main topics of plant propagation with a view towards sustainable practices. They will perform all aspects of seed propagation including seed storage, seed quality, seed dormancy, and the maintenance of environmental factors affecting seed germination. Students will perform micropropagation in a tissue culture laboratory. They will also perform traditional vegetative propagation (cuttings, grafting, division, layering, and specialized stems and roots) and discuss the proper environment used for each technique. Students will discuss plant breeding and contrast propagation methods used for native plants and plant clones.

Prerequisites: HORT 1102 or (HRTA 1100 and 1101 and 1102) or (HRTA 1110 and 1111)

HORT 1271 CR-2***Production Practices - Spring***

Students will perform in the School of Horticulture and commercial greenhouse facilities to gain experience in basic horticultural labour and equipment operations. They will maintain and harvest winter and spring season crops, such as Easter lilies, cut flowers, bedding plants, potted plants, greenhouse vegetables, and forestry crops. Students will be required to complete individual work practice sessions outside of formal class time. NOTE: Fieldtrips to commercial operations are an integral part of this course.

HORT 2300 CR-2***Horticultural Work Experience***

Students will participate in an approved work experience in the horticulture industry. They will apply their landscape, turf or production horticultural skills in a commercial setting. Upon completion of the work experience students will prepare a written report and give an oral presentation on their experiences.

Prerequisites: HORT 1122 or 1134 or 1171 or 1271

HORT 2304 CR-2***Grounds Machinery***

Students will study, operate, and maintain the turfgrass equipment used in a modern golf course or parks facility. They will perform maintenance and repairs on the machinery used for turf cultivation, renovation, mowing, spraying, and other types of grounds maintenance. Students will discuss the selection and purchasing of machinery. They will propose and design a turf care facility within the context of sustainable practise.

Prerequisites: [HORT 1116 or (HORT 1107 and 1108)] and [HORT 1230 or HRTA 1230 and 1231 and 1232]

HORT 2308 CR-3***Landscape IPM***

Students will undertake a detailed study of specific pest problems common to ornamental and native trees, shrubs, ground covers and turfgrasses, with an emphasis on diagnosis. They will explore pest life cycles, plant symptoms, pest prevention and pest control. Students will also gain an understanding of integrated pest and disease management using a variety of methods including Internet resources, pest management computer programs and diagnostic CD-ROMs.

Prerequisites: (HORT 1155 or 1145,) and [HORT 1201 or (HORT 1101 and 1207) or (HORT 1217 and 1101) or (HRTA 1200 and 1201)].

HORT 2320 CR-3***Landscape Design 1***

Students will practise the basic principles of landscape design for single-family residential properties, including plant composition, creative problem solving, functional and design uses of landscape materials, client and maintenance criteria. They will prepare working drawings such as concept and planting plans for actual clients. Students will investigate the history of landscape design.

Prerequisites: (HORT 1224 or 1220) and (HORT 1155 or 1145) and (HORT 1255 or 1225)

HORT 2330 CR-3***Turfgrass and Environmental Stress***

Students will examine the effects of environmental stresses (including atmospheric, climatic, soil, and biotic stresses) on turfgrass growth, development, and function. They will discuss and apply management techniques, and will study the development of new techniques.

Prerequisites: HORT 1104 and HORT 1230 or (HRTA 1230 and 1231 and 1232)

HORT 2333 CR-3***Turfgrass Pest Management***

Students will undertake a detailed study of the pests and weeds common to turfgrasses, and plants associated with turfgrass areas. They will examine and discuss pest life cycles, plant symptoms, pest prevention and control, and pesticide storage and use. Students will also learn about the importance of integrated weed, pest, and disease management using a variety of methods including Internet resources, diagnostic CD-ROMs, and interaction with pest management colleagues. Students will practice using pest control equipment on outdoor turfgrass.

Prerequisites: HORT 1230 and [(HORT 1201 or (HORT 1101 and 1207) or (HORT 1101 and 1217) or HRTA 1200 and 1201]

HORT 2334 CR-3***Irrigation, Drainage and Lighting***

Students will study the soil-water-plant relationship as it applies to landscape irrigation and drainage. They will maintain, install, and design irrigation and drainage systems with a focus on residential or small-scale systems. They will also study the installation and maintenance of landscape lighting.

Prerequisites: Principles of Math 11 or Applications of Math 11 or ABEM 0082 or 0011 or PSPM 1082 or MATP 1011 or HORT 1094 or MATH 1093 or a Horticulture Math placement exam with a C.

HORT 2335 CR-2.5***Sports Turf Management Practices***

Students will study and apply management techniques for specialized turf areas such as football, rugby and soccer fields, baseball diamonds, bowling greens, grass tennis and croquet courts. They also examine the management of alternate sports surfaces including synthetic turf athletic fields, skinned baseball infields, clay and asphalt tennis courts, and hybrid turf/synthetic sports fields. Students will practice sports turf maintenance.

Prerequisites: HORT 1230 or HRTA 1230 and 1231 and 1232)

HORT 2355 CR-3***Plant Identification 3***

Students will identify annuals, biennials, perennials, bulbs, ornamental grasses, shrubs, and trees, including native materials. They will discuss each plant with respect to form, texture, habit, foliage, flower and fruit characteristics, cultural requirements, and use in gardens and specialty landscapes.

Prerequisites: HORT 1155 or 1145

HORT 2371 CR-3***Fall Floriculture***

Students will describe and apply the general floriculture production principles and commercial practices of selected cut flower crops grown in the Canadian greenhouse industry. They will practice production techniques on flower crops grown in the Horticulture field laboratory greenhouses. Students will examine sustainable production practices and sustainable certification programs used in the floriculture industry.

Prerequisites: (HORT 1171 or 1271) and (HORT 1201 or HORT 1217 or HRTA 1201)

HORT 2372 CR-3***Greenhouse Vegetable Production***

Students will study and practice the culture and management practices of greenhouse vegetable crops, including propagation methods, production of the crop, end of year clean-up, marketing, and economics of vegetable production. They will study temperature, nutrition, crop scheduling, integrated pest management and variety selection. Students will grow tomatoes, cucumbers, and sweet peppers. Minor protected crops will also be examined. They will study food safety legislation and safe food handling practises.

Prerequisites: (HORT 1217 or 2378) and (HORT 1171 or 1271)

HORT 2375 CR-3***Production Facilities and Equipment***

Students will study the essential elements of greenhouse site selection and site layout. They will analyse the features and benefits of common types of greenhouse structures and covering materials. Students will investigate benching types and layouts, irrigation systems, and greenhouse components. Other specialized systems, such as heating systems, will also be covered. During labs, students will monitor and maintain greenhouse facilities and equipment. Visits to commercial greenhouse operations will introduce concepts of mechanization, relating this to classroom exercises on horticulture ergonomics and efficiency.

Prerequisites: HORT 1116 or (HORT 1107 and 1109)

HORT 2378 CR-3***Greenhouse and Nursery Pests***

Students will study major greenhouse and nursery pests, including insects, fungi, bacteria, and viruses. They will learn pest identification in the laboratory and on site by working with live and preserved specimens, as well as by interacting with pest management professionals. Students will practice monitoring and control methods in the greenhouse and field. They will develop and evaluate integrated pest management programs using a variety of resources including Internet and diagnostic CD-ROM programs.

Prerequisites: HORT 1217 or 1201 or (HORT 1101 and 1207) or HRTA 1200 and 1201). Valid BC Pesticide Applicator Certificate, Agriculture Producer.

HORT 2412 CR-3***Landscape Estimating and Contract Administration***

Students will learn to prepare, administer and manage contracts and estimates for landscape projects. They will study and practice techniques for writing landscape contracts, and discuss multiple approaches to preparing landscape estimates. Students will summarize insurance, bonds, liens, and explore the relationships between financial, cost and cash flow accounting systems as they relate to the operation and management of a landscape company.

HORT 2420 CR-3***Landscape Design II***

Students will explore the design challenges associated with residential sites and small scale public spaces. They will practise design skills such as cut and fill calculations, site and client analysis, and plant composition. Students will prepare working drawings such as grading plans, elevations and construction details.

Prerequisites: HORT 2320

HORT 2426 CR-3***Landscape Construction***

Students will explore both the theory and practice of landscape construction. They will have an opportunity to practice the construction and installation of landscape features such as patios, decks, retaining walls, ponds, fences, and arbors.

Prerequisites: HORT 1122 or HRTA 1321

HORT 2436 CR-3***Golf Course Management***

Students will study the operation and management of the golf course in the context of golf as a recreational activity, a competitive activity, and a business. Students will assess the impacts of the rules of golf, the play of the game, environmental stewardship, the organization of the turf care operations, and the organization of the golf business on golf maintenance operations. They will also analyze best management practices.

Prerequisites: HORT 2330

HORT 2437 CR-3***Golf Course Irrigation Systems, Designs, and Operations***

Students will design, analyze, and maintain golf course and athletic field irrigation systems. They will analyze sprinkler head selection and performance, pumping systems, valves types, controllers, software, and pipe characteristics. Students will discuss issues of water use and water quality. Through laboratory exercises students will perform irrigation audits, calculate water delivery, and schedule irrigation.

Prerequisites: [HORT 1230 or (HRTA 1230 and 1231 and 1232)] and HORT 2331 or 2334

HORT 2442 CR-3***Arboriculture II***

Students will practice hazard tree assessment, plant diagnosis and tree appraisal. They will analyze and practice tree preservation techniques and preventative tree maintenance and repair.

Prerequisites: HORT 1240

HORT 2463 CR-3***Nursery Production***

Students will review and analyze all aspects of container and field nursery production (trees, shrubs, vines, and herbaceous perennials) in British Columbia. They will practise activities such as potting, weeding, pruning, fertilizing, and irrigation maintenance in the field lab nursery. Students will discuss current production trends and environmental guidelines.

Prerequisites: [HORT 1104 or (HRTA 1104 and 1105)] and HORT 1261

HORT 2472 CR-2***Forest Crop Production***

Students will study the culture and management of the forestry crops that are grown in Western Canada. They will develop management techniques for propagation, temperature and light control, fertilization, and integrated pest management for forest seedling crops.

HORT 2473 CR-3***Greenhouse Environments***

Students will study the control of greenhouse environments, including heating, cooling, humidity, air circulation, lighting, carbon dioxide. Students will use the computerized controls in the School of Horticulture field lab greenhouses to monitor and manage greenhouse environments.

Prerequisites: Principles of Math 11 or Applications of Math 11 or HRTA 0096 or HORT 1094 or ABEM 0082 or ABEM 0011 or PSPM 1082 or MATP 1011 or MATH 1093 or Kwantlen's Horticulture/Mathematics placement test.

HORT 2477 CR-3***Production Horticulture Management***

Students will explore issues facing a production manager in a commercial greenhouse or nursery business, including crop decisions, scheduling, space and time management, and costing. Students will develop a production plan as a major term project.

Prerequisites: (HORT 2371 or 2472) and BUSI 1209

Corequisites: HORT 2372 or 2464

HORT 2479 CR-3***Spring Floriculture***

Students will study general floriculture principles and the commercial production practices of selected flower crops and bedding plants grown in the Canadian greenhouse industry. They will practice production techniques on the flower crops grown in the Field Lab greenhouses

Prerequisites: HORT 2378 and (HORT 1171 or 1271)

HORT 2490 CR-3***Organic Greenhouse Crop Production***

Students will differentiate between 'organic' and other greenhouse production systems against a background of plant breeding and genetic modification (GM) of organisms. They will identify appropriate organic accreditation standards. Students will investigate crop rotations, understand principles of producing good quality growing media, and explain principles of crop nutrition and disorders for greenhouse vegetables or flowers. Students will develop an integrated pest management (IPM) plan within organic constraints for a specific greenhouse crop, investigate the marketing of organic produce and identify FOODSAFE and Hazard Analysis and Critical Control Point (HACCP) production techniques.

Course Descriptions: Urban Ecosystems Major

HORT 3xxx CR-3

Communities and Horticulture (new)

Students will examine the relationship between people, the natural world, and constructed landscapes by analyzing the landscapes for patterns of successful design, biodiversity, and physical connections between sites in the same geographic area. Students will also assess public landscapes for community accessibility and social interaction.

Prerequisites: HORT 1155 and HORT 1110 Plus 6 HORT electives

HORT 3xxx CR-3

Water Resources (new)

Students will examine water flow through landscaped areas. They will develop sustainable water management strategies that minimize water use and maximize water conservation by using, capturing, and recycling techniques. Students will study watershed management, storm water management, and use of grey water in the landscape.

Prerequisites: BIOL 1110 and ENVI 1106 and MATH 1117 and HORT 1104

HORT 3xxx CR-3

Sustainable Production (new)

Students will sustainably produce crops that can be incorporated into urban landscapes and parks including native plants and food crops suitable for small garden plots. They will employ required soil cultivations methods, propagation techniques, and fertility levels to create sustainable growing conditions in both protected and unprotected environments. Students will also examine organic techniques and install a planting site using principles of permaculture.

Prerequisites: HORT 1155 and HORT 1217 and HORT 1110 Plus 6 HORT electives

HORT 3xxx CR-3

Inventory of Plant Communities (new)

Students will perform plant inventories on a variety of landscaped sites using survey techniques to assess healthy levels of biodiversity and distribution within transition zones between dissimilar land use areas. Students will also examine the interrelationship of plant communities within specific macro and micro biogeoclimatic zones.

Prerequisites: HORT 1155 and BIOL 1110

HORT 3xxx CR-3

Landscape and the Environment – Theory (new)

Students will analyze the principles of sustainable landscapes and perform a site assessment of features, contours, site conditions, and existing plant material. Students will then plan a sustainable landscape using appropriate criteria after exploring client use requirements of the site as well as land use policies and municipal planning and zoning bylaws.

Prerequisites: HORT 3xxx Communities

HORT 4xxx CR-3***Landscape and the Environment – Applications (new)***

Students will implement a sustainable landscape design plan by preparing soil and installing hardscape features, and plant material. They will practise sustainable installation methods to minimize pollution, greenhouse gas emission, and waste. Students will use sustainability criteria to evaluate the completed landscape. They will be encouraged to form community partnerships to access an installation site.

Prerequisites: HORT 3xxx Landscape and the Environment - Theory

HORT 4xxx CR-3***Riparian Management (new)***

Students will discuss the functions of waterways and wetlands and assess the management strategies used for areas adjacent to these waterways. They will install natural water filtration systems and waterway bank stabilization options. The installations will be evaluated for erosion control, slope maintenance requirements, wildlife habitat, and safety.

Prerequisites: HORT 3xxx Water Resources and HORT 3xxx Inventory of Plant Communities

HORT 4xxx CR-3***Landscape Management (new)***

Students will analyze and manage landscapes to minimize labour, energy inputs, pollution, and emission outputs. They will evaluate landscapes and maintenance requirements using sustainable sites criteria.

Prerequisites: HORT 3xxx Landscape and the Environment – Application and BUSI 1205 and BUSI 1209

Course Descriptions: Plant Health major

HORT 3xxx CR-3***Entomology (new*¹)***

Students will identify a variety of arthropod pests that are commonly found in the landscape and production horticulture environments and will examine the anatomy, reproduction mechanisms, life cycles, and behaviours of each. In preparation for the development of control strategies students will analyze the distribution and habitat of a wide variety of pests and recognize the pest injury to plant parts.

Prerequisites: BIOL 1110 and BIOL 1210 and (HORT 2308 or HORT 2333 or HORT 2378)

HORT 3xxx CR-3***Plant Pathology (new*)***

Students will learn how to recognize and diagnose plant disease. They will study the nature, physiology, and reproduction strategies of viral, bacterial, algal, and fungal plant pathogens. They will also study nematodes as plant pathogens. Students will learn how to manage plant disease in natural ecosystems, landscapes, and horticulture production environments.

Prerequisites: BIOL 1110 and BIOL 1210 and (HORT 2308 or HORT 2333 or HORT 2378)

¹ (new*) Plant Health Upper Level new course descriptions have been accepted under the B.Sc. IPM degree currently under review. Course outlines have not been written.

HORT 3xxx CR-3***Biological Pest Management (new*)***

Students will use biological control agents to control pests in protected production environments and outdoor landscapes. Students will study the biology, reproduction strategies, and life cycles of both indigenous and introduced biological control agents, as well as the mechanisms the agents employ to kill harmful pests. Students will also study methods used to isolate new biological pest control agents and subsequent development as a commercial product

Prerequisites: BIOL 1110 and BIOL 1210 and (HORT 2308 or HORT 2333 or HORT 2378)

HORT 3xxx CR-3***Integrated Pest Management (new*)***

Students will learn how to control pests commonly found in landscapes and production horticulture, by performing a variety of techniques. Mode of action, as well as safety and environmental concerns pesticides will be discussed. Students will integrate biological, physical, and chemical control options into control plans. They will use pest barriers, traps, and pesticide application equipment. Students will employ proper safety procedures when using pest control devices.

Prerequisites: HORT 3xxx Entomology and HORT 3xxx Plant Pathology and HORT 3xxx Biological Pest Management and ENVI 1106 and MATH 1117

HORT 4xxx CR-3***Environmental Effects of Plant Health Practices (new*)***

Students will study the effects of various plant health practices on the environment. Conversely, students will also assess the impact of natural and man-made environments on pest evolution and changes in population dynamics. They will construct plant health strategies that mitigate environmental impacts by studying a diverse range of research initiatives.

Prerequisites: HORT 3xxx Entomology and HORT 3xxx Plant Pathology and HORT 3xxx Biological Pest Management and MATH 1115

Co-requisite: HORT 4xxx Scouting, Monitoring and Assessment

HORT 4xxx CR-3***Scouting, Monitoring and Assessment (new*)***

Students will learn how to monitor pest populations and use meteorological equipment to gauge changes in pest numbers. They will apply a variety of scouting methods on a range of crop production and landscaped areas. Students will also monitor and assess pest numbers and make comparisons with economic thresholds in preparation for control recommendations.

Prerequisites: HORT 3xxx Entomology and HORT 3xxx Plant Pathology and HORT 3xxx Biological Pest Management and MATH 1115

HORT 4xxx CR-3***National and Global Regulatory Issues in Plant Health (new*)***

Students will study the international movement of potentially destructive plant pests from a global perspective. They will select case studies that focus on the implications of pest movement via waterways, air, and road transportation. Students will also study Canadian legislative regulation and certification requirements, as well as regulations for countries that import or export plant material to and from Canada. They will present and discuss innovative methods used to manage or eradicate pests.

Prerequisites: HORT 4xxx Scouting, Monitoring and Assessment

COMMON TO BOTH MAJORS**HORT 4xxx CR 3*****Vegetation Management (new)***

Students will identify a wide range of common weed species, invasive plants, and noxious weeds. Life cycles and biology of difficult to control weeds will be studied. Students will plan and perform sustainable methods of physical, chemical, and biological weed control in a variety of environments including gardens, parks, wetland areas, crop production facilities, and living roofs.

Prerequisites: BIOL 1110 and ENVI 1106 and MATH 1117 and (HORT 3xxx Inventory of Plant Communities or HORT 3xxx Biological Pest Management)

HORT 4xxx CR-3***Society and Horticulture (new)***

Students will discuss and analyze the influence of horticultural activity on society. They will examine the relationship between personal beliefs of society and sustainable horticultural practices and determine the depth of societal ecological awareness and accommodation. Students will practice presentation skills.

Prerequisites: ENGL 1100

Co-requisite: PHIL 3033

HORT 4xxx CR-3***Enterprise Project in Horticulture***

Students will prepare a business plan, budget, and phased implementation plan for their research project. They will practice funding proposal writing and budget reporting as the research project progresses through each phase of execution. Students will prepare and present an evaluation of the cost structure and a final budget.

Prerequisites: BUSI 1209 and (HORT 4xxx Landscape Management or HORT 4xxx Scouting, Monitoring, and Assessment)

HORT 4xxx CR-3***Research Project***

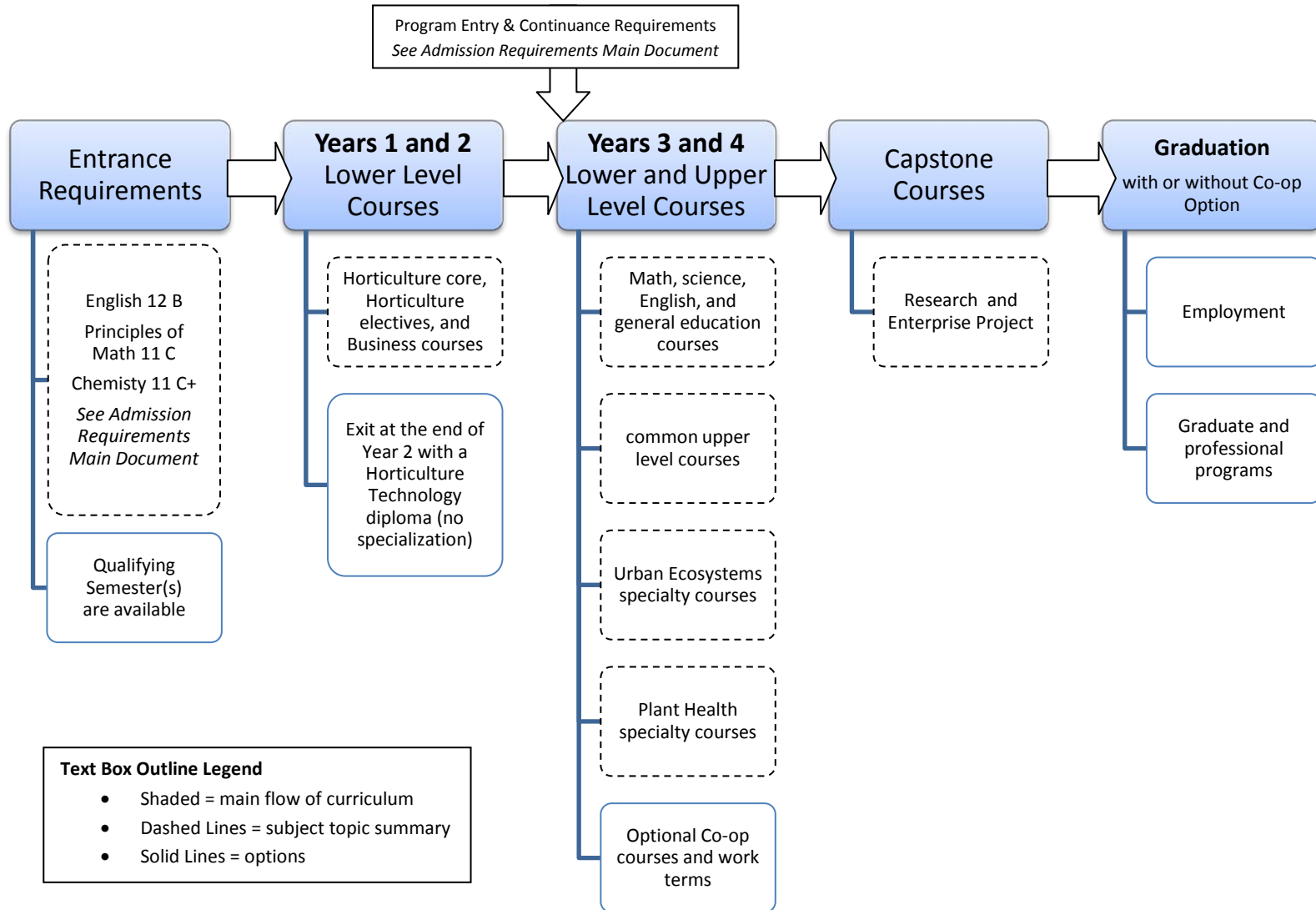
Students will plan, design and execute a research project that addresses a horticultural management problem. They will perform research trials or demonstration of sustainable solutions practicing leadership, collaboration, and management skills in teams of two or three. Student teams will be strongly encouraged to form partnerships with outside agencies or community groups.

Co-requisite: HORT xxx Enterprise Project in Horticulture

PHIL 3033 CR-3 (formerly ENTR 3033)***Business Ethics***

Students will study various ethical and meta-ethical theories and will apply them in standard business contexts such as employer-employee relations, risk analysis, occupational and product safety, environmental protection, and multinational practices. Students will acquire the tools to allow them to make ethical business decisions.

Appendix 2: Flow Chart



Appendix 3: Feedback from Industry, Government and Students

General comments: (Editor's note: changes have been made to the program in response to the comments below; initially, the program was described as a Bachelor of Technology degree when the Concept was prepared in 2009.)

Dave Woodske: I keep getting the impression the objective of the program is to focus on environmental issues. I find that focus to be narrow for a **Sustainable Urban Horticulture** program. May be the program needs to be called 'Environmental Urban Horticulture'? *(Editor's note: changes have been made to improve the balance of the program to encompass all aspects of sustainability)*

Amanda Jarrett: Yes, here is a thumbs up for the Bachelor of Technology degree: *Sustainable Urban Horticulture: Environments, Plants and People.*

Trisha McCarthy: This sounds like a positive leap forward - as they have had similar degrees set up for years in Britain and Europe. Sustainable Urban Horticulture: Environments, Plants and People. It sounds great – will it be a 2 year degree?

Colin Cruickshank: There would certainly be opportunities for an individual that had such a degree. An individual with a strong knowledge of horticulture along with supervisory skills and effective communication skills would have significant opportunities. That being said there are a limited number of businesses that would be seeking those qualifications.

Depending upon personal capabilities a graduate of this program could be hired in a supervisory capability or onto a management career path. They could also look to developing their own business in production or landscaping.

Essential Employment Skills would include

- Horticultural knowledge – plant characteristics and growing requirements.
- Ability to evaluate horticultural systems and resources.
- Use technology to maintain sustainable plant systems.
- Communicate well, both orally and in writing.
- Practice supervisory and management skills if the individual was to be involved at a management level.
- Knowledge of plant water requirements and delivery systems.

Some of the questions asked are fairly general and difficult to provide answers to. Certainly the job titles that might be fulfilled by this program would be similar to those being filled by diploma students but hopefully these students would have the qualifications of a diploma student plus additional skills.

Industry Representatives

Cary Van Zanten, President,
Canadian Nursery and
Landscape Association

Richard Desmarteau, Fairfield
Tree Nurseries Inc.

Colin Cruickshank, Business
Manager, Bylands Nurseries
Ltd.

Amanda Jarrett, Amanda's
Garden Consulting Company

Paul LeBlanc, Biological
Systems Specialist, Koppert
Canada (graduate)

Government/Institutional Representatives

Kerly Ascosta, Centre for
Architectural Ecology BCIT

David Woodske, Manager,
Horticulture Unit, BC Ministry
of Agriculture and Lands

Sarah Pong, Canadian Food
Inspection Agency (graduate)

Trisha McCarthy, Horticulture
Supervisor, District of North
Vancouver (graduate)

Graduates of Horticulture Technology Program:

Charissa Pals
Geina Fournier

Sarah Pong: This is rather exciting - very forward-thinking! Opportunities for BSc grads definitely exist in the Canadian Food Inspection Agency (CFIA). From operations (day to day field work), there are full-time contracts every summer here in our office. There are full-time permanent positions in operations that do come up every now and then. For a university grad, programs (policy development - national) would be a possibility. We have all sorts of education backgrounds just in Plant Health, there are us HORT diploma graduates, BSc in Biology, Entomology, Plant Sciences, Masters of Biology, Pest Management, we have PhD's.

I think different educational backgrounds and experiences are invaluable in our workplace. One of the most valuable characteristics of a colleague here is experience. Any formal education cannot replace experience. Not just doing data-entry for a summer, but actual hands-on experience in the industry, in the outdoors, (grunge work!)

Salary for (these are approx): Summer contracts: ~\$37,500 Annual = ~\$3125/month (BEFORE deductions)
 Operations Plant Health Permanent: ~\$45,400 Annual = ~\$3780/month (BEFORE deductions) Programs: ~\$50,000 Annual = ~\$4160/month (BEFORE deductions) - I think these guys make a little more than that, this is a rough low-ball.

I know of only couple of clients in our work that are gearing towards specialty "green" products for landscaping/building. I have a feeling there must be more out there, these clients of ours do import/export, that's the only reason we have contact with them. With that said, as a consumer, I would choose a service company that promotes sustainability. Cost would be a secondary consideration.

Questions:

1. Please forecast on developments within your sector relative to the program outcomes.

Kerly Acosta	The outcomes of these graduates are already in demand in the green building sector and green roof industry specifically. A great local example of a consulting company they would appreciate the work of these graduates is called "Recollective". More and More buildings are being designed to consider the site ecology and to design buildings that interface with the environment flawlessly. Designing to increase harmonious connection between the environment and building is where there is definite growth in the green building movement.
Geina Fournier	Of course defining the market is essential as the graduates will be competing for jobs amid the ecologists, resource managers and the like. As a Landscape Designer/Installer/Maintenance BTEch graduate, let me suggest in four years from now, will the public have not already been educated in the ideas based in sustainability and the survival of All ...do you not think then that the word (title) 'sustainable' will have become an overused slogan and a newer trendier slogan taking its place ... maybe consider dropping this word and call the program <u>Urban Horticulture: Environments, Plants and People</u> for it stands alone very well. The notion of Urban Horticulture will support the graduates in a more distinctive manner.
Cary Van Zanten	A large focus should be on supervisory and management skills (hands on applications still need to be 10-25% of this job There seems to be too much focus on points #2-#10 as an office/ political/ or governance job position rather than what the bases of this job should be as a assistant/head grower with management skills.

Gail Szostek	<p>Focus on Naturescaping.....integration of natural ecosystem plantings within our urban environment including use of more native plants, less disturbance of surrounding natural ecosystems, and trying to create less of a discrepancy between the urban environment and the natural environment. I would say this is also true for the transition from the agricultural environment to the natural environment. There are many conflicts that exist between urban, rural, and natural environments; and the transition zones and effective creation of space among all three is essential in the less urbanized municipalities. For example the pressures here in Maple Ridge are that the farmers want more of a transition zone between their land and the densely urban developments and the natural environment, in order to successfully farm. And even though many urban residents like to back onto agricultural or natural environments, there are often conflicts that take place there as well.</p> <p>The areas most under regulation from both provincial and federal agencies are watercourses. An understanding of how the setbacks on these watercourses work, and how this impacts the development and landscaping of property is essential for someone working in an Urban Environment position. I think a basic understanding of the biology of watercourses and wetlands and their essential role in the urban environment for sustainability of drainage, fish populations, and wildlife corridors would go a long way in helping a student work in this field within an urban context.</p> <p>Hand-in-hand with that is some basic knowledge of ecological restoration, and why certain plants should or should not be included in restoring natural habitats within the urban environment. There is, of course, an extremist point of view that only 100% of native plants should be used in restoration. I personally think that for every restoration project, there is a whole pile of options that may include only native plants or may include some variations of native plants, or that may even include non-native plants, depending on the location, the regulations around that location, and the proximity to urban densities, agricultural activity, and wildlands. It is enough to be a course on its own, but some basic knowledge of basic fundamental principles here would be healthy for someone moving into this line of work.</p> <p>One of the areas that is weak in many programs that could be offered here, includes forest edge treatments and effects of clear-cutting forested lands. The horticulture programs deal largely with trees in a purely ornamental way, and not so much with the horticultural aspects of natural or native stands of trees on developments. The biology programs deal a lot with forestry type standards of tree treatments. And so there is somewhat of a gap in the knowledge of the integration of these two, where natural tree stands become part of the urban environment and what does this mean. How do we deal with blowdown issues and wildfire issues when the urban environment butts up to a natural environment? I myself have learned most of what I know in this area from attending seminars and workshops on various aspects of this.</p> <p>Another area where my work is directly involved in this sort of program potential is in the review of landscape architect plans for new developments. It looks like you are covering some aspects of this in numbers 4, 5, and 6 above. The dilemma for me as an on-ground horticulturist vs. a designer is that most professional drawings indicate an unnecessary density of new plantings that become a maintenance nightmare in three or more years. For me, part of sustainability is to make the landscape an efficient entity to be maintained, and also that there are not an excessive amount of resources (including plant material) going into the system in the beginning. Yes, plants are green, but the production methods that are used in many nurseries to produce the black plastic pots of highly fertilized and watered plants are not really all that green! And proper densities are essential to a healthy and sustainable plant system. Too much over-planting is happening for that instant look.</p>
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Charissa Pals	The outcomes seem to support those companies leading the way for sustainability. It seems like many other companies will soon follow, if not willingly, because of client demands.
Paul LeBlanc	<p>Integrate urban ecology, agro ecology, and biodiversity in the development of successful ecological solutions</p> <p>Intense farming of high value organic crops, as you know, have been growing by a rate of roughly 10% a year in North America yet there has been limited opportunities for companies to service these producers due to the lack of universal North American standards. This is changing, and opportunities for consulting, products and services are growing.</p>

2. Please forecast on employment opportunities within your sector for a graduate of this type of program.

Kerly Acosta	The employment opportunities are there as design firms are trying to answer this question on how to design with the environment in mind. This graduate from this program sounds like they will be equipped to offer a somewhat new service to a growing demand.
Geina Fournier	Jobs ... hard to say ... as suggested above it seems to merge with ecologists, environmentalists, resource managers, biodiversity consultants, water specialists etc. What would separate the BTech from this crowd? The practical aspects of this program ... then how does it differ from the Diploma? Urbanness? Residential? What? It seems they would be consultants working with this crowd as the plant specialist.
Cary van Zanten	Definitely an opportunity in an entry level assistant grower(s) then based on performance to the head grower by sector of overall.
Gail Szostek	<p>This is a difficult question to answer, when working within the public sector, because every municipality or political jurisdiction is at the whim of elected officials and the state of the economy. Positions in Environmental fields in local politics may be seen as very important for one Council and not very important for another. Looking at recent history, most municipalities have hired staff into new positions in the Environment field in the last 3 to 5 years. In Maple Ridge, a new position of Environmental Planner was established about 4 years ago; and a second Environmental Technician position was added in the last year. However, there is likely not to be any more growth in this section for a long time coming, given the economic and political climate that reigns at the moment. However, the type of education to be had by the program being proposed would be useful in many public sector areas including Planning, Parks, Environment, and Leisure Services.</p> <p>On the other hand, Environment and Sustainability are definitely the words of the day, and even though there may not be as many public sector positions coming along, I would suspect that the knowledge offered by a program such as this would be useful in many private sectors as the public sector contracts out work with more strict environmental and sustainable standards in place. LEEDS certification in building has landscape elements to it; and Ecological Restoration is looking at creating some similar standards to be certifiable in that field as well. Landscape design firms and environmental consulting firms would both benefit greatly from having staff knowledgeable in these areas.</p>

Charissa Pals	<p>I see graduates becoming Urban Foresters, starting responsible landscape companies, being integral in other landscape companies, working for environmental sectors of the government and municipalities.</p> <p>Temporary Full Time Environmental Technical Assistants</p> <p><i>Engineering & Public Works Department,</i></p> <p>Duties: <i>Reporting to Engineering & Public Works, Development Services & Community Planning, or Parks & Open Spaces Services, while working under minimal supervision, you may work in the following role:</i></p> <p><i>You will work as a team in the organization, preparing, and delivering various environmental initiatives including; invasive plant removal (65%), storm water outfall assessments (12%), recycling and waste reduction initiatives (10%), public education and events (7%), storm drain marking (2%), data recording and computer entry, and native species planting.</i></p> <p>Qualifications: <i>These summer positions are well-suited to self-starting students enrolled in resource management, environmental studies or life sciences and returning to school in the fall. You must enjoy working outdoors performing regular physical activity. Some duties are routine and require good self-discipline and attention to detail. It is required you possess the following:</i></p> <ol style="list-style-type: none"> <i>1. Experience in public education and public interaction including working with children</i> <i>2. Experience working with volunteers or stewardship groups and an interest in community development;</i> <i>3. Experience in environmental activities or issues, e.g., invasive species management, waste management and recycling, etc.;</i> <i>4. Excellent written/verbal communication and public relations skills;</i> <i>5. Demonstrated organizational ability and creativity;</i> <i>6. Ability to work well independently and as part of a team; and</i> <i>7. Candidates must have a clean, valid BC Class 5 driver's licence.</i> <p><i>Additional assets would be to possess the following:</i></p> <ul style="list-style-type: none"> <i>• Experience in marketing and communications;</i> <i>• Experience maintaining and operating small hand tools, e.g. brush cutters;</i> <i>• Familiarity with City of Coquitlam and key natural features or landmarks;</i> <i>• Experience in data collection, recording/entry and mapping;</i> <i>• Proficient computer ability using MS Access, Excel, Publisher and Word;</i> <i>• Knowledge of environmental regulations, legislation and applicable bylaws;</i> <i>• Native and invasive plant identification skills</i> <p>Urban Forestry Technician - Full-time (One-year term)</p> <p><i>As the Planning and Development team's specialist in all matters pertaining to trees, you will apply considerable independent judgment and initiative in performing technical regulatory, inspection and enforcement work. You will be responsible for reviewing development plans, landscape plans and arborist reports. You will also respond to tree-related concerns from the public and other departments, discuss issues on tree retention/replacement and explain and monitor adherence to the City's environmental policies.</i></p> <p><i>University graduation in an arboriculture-related program or equivalent is required. Eligibility or certification as an Arborist with the International Society of Arborists is an asset. Along with</i></p>
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	<p><i>excellent oral and written communication skills, you should have experience in and knowledge of:</i></p> <ul style="list-style-type: none"> • <i>applicable policies, procedures and by-laws</i> • <i>arboricultural principles, practices and techniques</i> • <i>local tree species, diseases and pests.</i>
Paul LeBlanc	<p>As the proximity of urban areas and farm land inevitably collide within the Lower Mainland, viable cropland will become a critical source of cheaper local produce. I see graduates as potential advocates, service providers, educators, and governmental policy makers to guard this resource and to help blur the boundary between agriculture and urban sprawl.</p>

3. Do you think this employment would be full time, part time or contractual?

Kerly Acosta	I think this type of employment would be contractual or on a consultation basis.
Geina Fournier	This job would most likely be contractual working alone or within a group of specialists.
Cary van Zanten	Ideally full time should focus be as assistant growers focus.
Gail Szostek	In the public sector, this work tends to be full time, when it comes around. However, in the private sector (which is often linked to the public sector through contracts) the work could be any of the above.
Charissa Pals	I see it as full time and/or contractual.
Paul LeBlanc	All

4. Please describe existing and proposed job titles and descriptions fulfilled by the program outcomes.

Kerly Acosta	Sustainability Horticulturist, Ecological Urban Designer
Geina Fournier	Job titles? ... Urban Horticulturalist specializing in urban plantings ... consulting or working within with cities, regional governments, and the park systems ... understanding made-made environments (soils, plants and water science base)
Cary van Zanten	Head grower or assistant grower (points #1-#2). Balance would apply to a provincial/national growers association office as category manager in growers commodities. Municipal Land & Environmental positions. Only based on our current needs or requirement, a management/hands on grower or assistant.
Gail Szostek	The proposed program does not specifically fulfill any job description we have here. Although it would be useful for many of the job titles within the District of Maple Ridge, in Parks and in Planning, it would probably not entirely fulfill all requirements. In the first question I covered the things that my position deals with that could be included in the program, and most of those things are included in my job description. However other job descriptions within

	<p>Planning may be more specifically to review work/contractor design plans, decision making around sustainable plant systems within developments, and integration of natural plant systems and designed urban systems. In Parks, the job descriptions would be more around supervisory skills and management of plant systems on the ground, with some design and implementation work.</p>
<p>Paul LeBlanc</p>	<p>Grower, consultant, entrepreneur, CFIA, OMRI inspector. ALR inspector. Town planning consultant.</p>

5. Please rank essential employment skills from most to least importance.

<p>Gail Szostek</p>	<p>For the job I currently hold:</p> <ol style="list-style-type: none"> 1. site analysis for environmental impacts from development or land-owner works – requires knowledge of soils, trees, habitat ecology, drainage and stormwater patterns, geotechnical issues on slopes, erosion and sediment control, wildlife ecology (beaver, fish, mosquito, Species at Risk, and other wildlife), ditch enclosure impacts and invasive plants. 2. review of horticultural designs within the urban context to ascertain sustainability, environmental, and planning landscape standards are met – requires basic horticultural knowledge, plant growing conditions, plant identification, plan review and verification, ability to make recommendations for design changes to fit the environment 3. communication skills with general public, contractors, developers, other internal departments, other government agencies etc. – requires knowledge of levels of government, contractual obligations, enforcement options, reporting to Council and department heads, general public information sessions, one-on-one public complaints/enquiries 4. basic computer and mapping skills to supplement all of above <p>Although these are numbered, it is difficult for me to say one is more important than the other, as they are all intertwined.</p> <p>In Parks work, the list would be more like this:</p> <ol style="list-style-type: none"> 1. sound horticultural knowledge including plant ID, soils, plant health care, organic principles, design principles 2. natural plant systems including native plants and soils, natural ecosystem health, restoration principles, wildlife and habitat 3. supervisory and management skills including time management, priority setting, conflict resolution, clear communication 4. communication skills to public and interdepartmental
<p>Charissa Pals</p>	<ul style="list-style-type: none"> • ability to work well, independently or in teams • experience specific to job • knowledge specific to job • communication skills/public relations • organizational skills, including use of computers • a desire to learn new skills, techniques, etc.

What would a salary range be for this type of employment?

Geina Fournier	Salaries ... who knows now-a-days ... probably from about \$40,000 - \$80,000
Cary van Zanten	Assistant \$ 40000-\$45000, Head Grower \$55,000-\$65,000
Gail Szostek	Within the public sector, the salary range would likely be between \$45,000 to \$60,000
Charissa Pals	\$18-40/hr
Paul LeBlanc	40-60k

6. Please list certification or professional association memberships that would be essential and / or desirable.

Kerly Acosta	LEED certification would compliment this program. As well as being members of the Green Roof for Healthy Cities, Eco-city builders http://www.ecocitybuilders.org/consult.html
Gail Szostek	I am not sure whether you mean for the proposed program, or for the position I am in. Either way, the answer is likely similar. ISA certification including Tree Risk Assessment - desirable Certification in a plant field: diploma in Horticulture or Biology or Wildlife Management or Agrology, CHT, Journeyman Gardener, (something that includes study in plant ID and soils) – essential if the proposed program is not covering off these basics; desirable if it is.
Charissa Pals	BCLNA, CHT, Cert Arborist

7. Please provide your comments on the potential for growth in this sector.

Kerly Acosta	This green building sector and green roof industry are still in their infancy in North America, which means there is a great deal of room to grow into a large industry as in Europe.
Geina Fournier	All the skills are required to make the whole, the wider the perspective the better for an effective graduate, make that bar high, expect uniqueness, innovation and wide understandings of the interconnecting systems and cycles of Life - from growing to planting into the future.
Cary van Zanten	There are short-falls in experienced personal requirements but I question if a new Kwantlen course needs be initiated or will have enough job placements for the graduating numbers.
Gail Szostek	I believe there is great potential for growth in this sector as all policies and standards are leading towards sustainability and environmental righteousness. Also, there is more emphasis on formal education than there used to be, and more emphasis on the importance of outdoor environments than there used to be. I believe a program that offers some basic knowledge in many of the areas discussed above would offer an individual an edge in many job recruitment

	situations in today's market.
Charissa Pals	I think there is a growing need for educated workers in this field as environmental changes make good landscape decisions more vital. The awareness of horticulture by homeowners is also increasing and the demand for this kind of knowledge as a result.
Paul LeBlanc	Love to. Formal education is an expensive hobby though. Like the laddering idea and part time? Nights? Would help get people like me in. Hate the title of the degree though. Way too hippie! <u>Sustainable Urban Environments.</u> That's better, Sky's the limit

Appendix 4: Faculty Curriculum Vitae (Summarized)

Carol Barnett, Ph.D. is an instructor in the School of Horticulture specializing in Nursery Production in the Apprenticeship and Technology Programs. She holds a M.Sc. in Horticulture Science from the University of Guelph and a Ph.D. in Floriculture and Ornamental Horticulture from Cornell University. She is a Professional Agrologist, a member in the B.C. Landscape and Nursery Association, and a member and a past Director of the International Plant Propagators' Society. She has been a nursery industry specialist for the province of B.C. and a researcher in projects focusing on fertilizer, media and plant growth assessment. She has written about plant propagation and nursery production in both the academic and popular press.

Patrick (PJ) Burns, B.A. is an instructor in the School of Horticulture specializing in landscape irrigation and drainage, construction, plant Identification and equipment operation. He has extensive community service with the B.C. Landscape and Nursery Association and serving for many years as a judge, judges' technical assistant and organizer of the Landscape Certification Examination. Burns has partnered with Douglas Park Community School in a Community Garden project which is located at the Field Lab of Kwantlen, Langley Campus. This collaborative project received the B.C. Landscape and Nursery Association Environmental Stewardship Award for 2009.

Elizabeth Cunnin, M. Ed. is an instructor in the School of Horticulture specializing in arboriculture, landscape estimating and contract management, landscape maintenance, plant identification and residential landscape design. She holds a Masters in Education in Educational Technology and Learning Design as well as a B. A. in Economics from Simon Fraser University. She also holds several trade certificates including Certified Arborist, International Society of Arboriculture and Certified Landscape Professional, Canadian Nursery and Landscape Association. Cunnin has extensive consulting experience and has published educational materials in the areas of arboriculture, Master Gardener Training, and plant identification.

David Davidson, M.Sc. is the Associate Dean of the School of Horticulture. Davidson specializes in soil fertility and plant nutrition. He holds a M.Sc. from the Department of Land Resource Science, University of Guelph. Davidson has extensive experience in turf management conducting research and serving as a moderator for the Western Canada Turfgrass Association. For a number of years Davidson served in cooperative extension at Cornell University conducting trials in the areas of turfgrass renovation and nutrition. He has also been a consultant to private industry in B.C. He has an extensive list of publications in trade journals on turfgrass management and fertilization practices. Davidson maintains membership in a number of professional societies including the Agronomy Society of America and the Western Canada Turfgrass Association. He also serves on a several Kwantlen Polytechnic University committees.

Renee Giardini, M.Sc. is an instructor in the School of Horticulture specializing in soil science. She has taught in the Horticulture Technology Diploma program and the Horticulture Apprenticeship program. Giardini has also taught at the Native Education Centre in Vancouver B.C. and at Vancouver Community College. She holds a M.Sc. in Soil Science and a B.Sc. (Agr) from the University of British Columbia. She is a Professional Agrologist and maintains membership in the Canadian Society of Soil Science and the Pacific Society of Soil Science.

Gary Jones, M.Sc., is Chair, Greenhouse and Nursery Horticulture at Kwantlen Polytechnic University, teaching greenhouse facilities and equipment, greenhouse vegetable production (conventional and organic courses), integrated pest management, and sustainable horticulture. He holds a B.Sc. (Honours) Agricultural Science (Horticulture), from the University of Nottingham, UK, and an M.Sc. in Irrigation Water Management from the Cranfield Institute of Technology, Silsoe College, UK. He has worked in production of both ornamental and food plants, and has provided technical consultancy within a team of ADAS (Executive Agency of the Ministry of Agriculture, England) specialists. He is a P.Ag. (Professional Agrologist) and a member of the Institute of Horticulture, London, UK. Jones maintains an extensive list of volunteer positions within the agriculture/ horticulture and Langley communities.

Stanley Kazymierchyk, B.Sc. is an instructor in the School of Horticulture specializing in turfgrass management. Kazymierchyk holds a B.Sc. in Turfgrass Management from Oregon State University. He has extensive industry experience working for golf courses and turfgrass suppliers and teaches a variety of courses focusing on golf course management. Kazymierchyk has held office and has been involved in a number of projects for the Western Canadian Turfgrass Association research committee and the B.C. Golf Superintendents Association.

Ron Marchuk, B.A. is an instructor in the School of Horticulture specializing in floriculture and greenhouse management. He holds a B. A. from Queen's University and is a member of the United Flower Growers Co-op Association in B.C. Marchuk has written several educational manuals and held directorships in Bedding Plant International and Alberta Greenhouse Growers' Association. He has presented at several greenhouse industry conferences.

James Alan Matteoni, B. Sci., M. Sci., Ph.D. is an instructor at Kwantlen Polytechnic University School of Horticulture, and an Associate with the Institute for Sustainable Horticulture. In addition, he serves as a consultant for Revenue Canada in the Scientific Research and Experimental Development review program for Horticulture and protected crops. He is also an instructor at the Richmond Farm School, Vancouver Environmental Youth Alliance, and Strathcona Community Gardens (Vancouver). He is a

Wright Fellow from the University of Illinois, and a Special Fellow from Cornell University studying at the University of Bordeaux. In 2002 he received the National Institute for Staff and Organizational Development (NISOD) international teaching award; and in 2003 the Outstanding Achievement Award in Pest Management in British Columbia from the Professional Pest Management Association of BC. He worked with the local vegetable growers to develop and commercialize bumble bees for pollination of greenhouse and field crops in western Canada. He is active on several Kwantlen Committees (IET, S2C2 subcommittee on instructional and educational technology, Kwantlen Polytechnic University Vision Committee). Presently he is the President of the PPMABC, and the secretary of the British Columbia Plant Protection Advisory Council. He currently works extensively with the British Columbia Landscape and Nursery and Trades Association, and the BC Greenhouse Vegetable Growers Association. His goal is to decrease our reliance on pesticides through conservation biological control, increase our awareness of food and water security in our region; and enhance opportunities for urban agriculture in metropolitan Vancouver. He has an extensive list of refereed research publications, as well as many articles on trade journals in English, French, and Spanish.

Bruce McTavish, M. Sc. M.B.A. is an instructor in the School of Horticulture and the School of Business specializing in horticulture business management. He holds a M.Sc. in Agriculture Mechanics from the University of British Columbia and a M.B.A. Executive Program from Simon Fraser University. McTavish has extensive experience as a consultant focusing on environmental issues for horticulture enterprises, biodiversity on farm land, soil survey and land capability assessments and occupational standards for Canadian and American horticulture industries. McTavish has consulted with and has developed strategic plans for nursery product suppliers. He is a Professional Agrologist and a Registered Professional Biologist serving in a number of capacities with the B.C. Landscape and Nursery Association, the Canadian Nursery and Landscape Association, B.C. Agriculture Council, Greater Vancouver Regional District (Metro Vancouver), the B.C. Greenhouse Growers Association, the B.C. Fruit Growers Association, the B.C. Road Construction and Maintenance Safety Network and HortEducationBC (HortTradesBC). McTavish has published a number of articles in trade journals and government publications.

Kent Mullinix, Ph.D. is currently Director- Sustainable Agriculture and Food Security, Institute for Sustainable Horticulture, Kwantlen Polytechnic University. Prior, he was Joint Endowed Chair in Pomology/ Associate Professor, Washington State University and Director- Institute for Rural Innovation and Stewardship and Agriculture Programs/Professor at Wenatchee Valley College. He has developed and overseen several technical and undergraduate agriculture programs and developed and taught many agriculture classes including Plant Science, Soils, Pest Management, Plant Propagation, Pomology, Research Methods, Topics in Agriculture (a capstone writing across the curriculum course), Preparing for the Horticulture Profession and Sustainable Agriculture. He also supervises graduate students. Mullinix worked on a diversified family farm, owned and operated an orchard and established and managed a 45 acre, organic, teaching and demonstration orchard that was an integral and central teaching facility for

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Susan Murray, M.Sc. is an instructor in the School of Horticulture specializing in plant identification, landscape design, arboriculture, and estimation, maintenance and construction of landscapes. She is past Chair of the Landscape Design and Installation Program and Coordinator of the Landscape Technology Program when it was offered a B.C.I.T. She holds a M.Sc. degree in Agriculture Extension from the University of British Columbia. Murray has consulted for the horticulture industry for many years. She has extensive experience in the design of educational programs and the appraisal of mature tree health. She is a Professional Agrologist, member of the B.C. Landscape and Nursery Association, as well as several local horticulture societies. She has achieved the status of Board Certified Master Arborist in the International Society of Arboriculture. Murray has published *Our Sylvan Heritage, A guide to the Magnificent Trees of the South Fraser, Arboriculture and the Law in Canada*, as well as several other industry based publications. She volunteers extensively as a speaker and judge, and has held executive positions for a number of horticulture societies throughout the Lower Mainland. Murray has traveled throughout the world visiting major gardens and arboreturns receiving a number of teaching and community awards for her dedicated service.

Michelle Nakano, B.A. is an instructor in the School of Horticulture specializing in plant identification, landscape installation and design. She is the Chair of Landscape Design and Installation and Turf Management Specializations. She holds a B.A. in Adult Education from the University of the Fraser Valley. Nakano has also held the position of Grounds Manager at Olds College in Alberta and Horticulturist at the national and district levels. She has presented extensively at a variety of Garden Club meetings and symposiums on sustainable landscape techniques. Nakano holds a LiveRoof System, Installer Qualification and consults and teaches on LiveRoof installation and maintenance methods. She is currently undertaking research projects on LiveRoof installation in collaboration with the Centre for Architectural Ecology, B.C.I.T.

Tony Puddicombe, Journeyman T.Q. as Landscape Horticulturist is an instructor in the School of Horticulture specializing in plant identification and landscape construction. He holds a Landscape Technician Certificate from B.C.I.T. and has extensive experience in landscape design, installation and maintenance. Puddicombe is a Certified Arborist and works with a number of horticultural groups in the Vancouver area as a volunteer.