

SENATE

MEETING DATE: *August 23, 2010*

AGENDA #: *3.7*

PRESENTED BY: *Dana Cserepes*

Issue: Approval of a full program proposal for a Bachelor of Science Biology Major,
Bachelor of Science Biology Minor

For approval: THAT Senate approve the full program proposal for a Bachelor of Science Biology
Major, Bachelor of Science Biology Minor

Full Program Proposal

Bachelor of Science
Major in Biology
Minor in Biology

Faculty of Science

Kwantlen Polytechnic University

August 10th, 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 Science Major in Biology; Bachelor of Science Minor in Biology.

c) Location

The BSc Major in Biology and BSc Minor in Biology programs will be offered on Kwantlen's Surrey campus. The first two years of each program will also be offered on the Richmond campus.

d) Faculty(ies) or school(s) offering the proposed new degree program

The Department of Biology, Faculty of Science and Horticulture.

e) Anticipated program 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 BSc Major in Biology in four years or eight semesters.

g) A summary of the proposed program

Key features of the BSc Major in Biology and BSc Minor in Biology include the following:

Aims, goals, and or objectives of the proposed program

The BSc in Biology has three major goals:

- To provide a foundational BSc degree that expands upon existing strengths of the Faculty of Science and which is strongly grounded in scientific methodology and practical skills.
- To equip graduates with a high level of competency in the knowledge, skills and experience necessary for competitive entry into the workforce in a wide range of fields.
- To prepare students for entry into a professional school or graduate studies program.

Anticipated contribution of the proposed program to the mandate and strategic plan of the institution

This program will address institutional priorities including Kwantlen's Mission and Mandate by:

- Embracing Kwantlen's polytechnic designation by offering baccalaureate degree qualifications which address gaps in science education in both the institution and the region.
- Offering a distinctive and applied program of study with a focus on community/industry based affiliations.
- Retaining student enrolments whilst enhancing Kwantlen's status as a receiving institution.
- Delivering an integrated, cohesive program of study designed to engage students and nurture their success.

Linkages between the learning outcomes and the curriculum design, an indication whether a work experience/work place term is required for degree completion, and if so a description of the purpose and role of the work experience within the program

The scope and sequence of this program is inextricably linked to the intended learning outcomes. Upper level courses build upon the core knowledge and skills developed in 1st and 2nd year, allowing exploration of more advanced biological concepts and practical techniques. This culminates in a community focused student research/directed studies project requiring a synthesis and application of the knowledge and skills they have learned. An optional Co-op Education Program will provide graduates with valuable context and experience relevant to potential career options.

Potential areas/sectors of employment for graduates and/or opportunities for further study

Students will be well equipped for a diverse range of employment opportunities in such fields as Genomics, Molecular Biology, Wildlife and Habitat Conservation and Biotechnology. Academically, students will be well prepared for entry into a wide variety of post-secondary opportunities.

Delivery methods

Full and part-time study options will be available to students with course offerings that employ a range of delivery methods. Online and mixed-mode delivery options will be explored.

Program strengths

The key strengths of the BSc in Biology include:

- A high level of learner engagement facilitated by small class sizes and hands-on learning experiences including lab activities, research opportunities and Co-op experience.
- Producing skilled graduates equipped with a competitive edge in the job market and an awareness of community needs and resources.
- Capitalizing on high enrolments in Biology and employing the academic strengths of current faculty.
- The utilization of existing and proposed programs of study to maximize integration and to economize on resources.

An overview of the level of support and recognition from other post-secondary institutions and relevant regulatory or professional bodies, where applicable, and plans for admissions and transfer within the British Columbia post-secondary education system

This program is recognized and supported by several post-secondary institutions in the lower mainland. It targets students who are currently enrolled in 1st and 2nd year Biology courses who are seeking to obtain a science qualification in this field.

The BSc in Biology is intended to retain students, provide opportunities for students to transfer in from other institutions and provide access for adult learners to update their qualifications. Students may also transfer into the BSc in Health Science degree at the end of 2nd year.

Related programs in the institution or other British Columbia post-secondary institutions. Indicate rationale for duplication, if any.

Biology programs are a fundamental component of post-secondary institution offerings. The small class sizes, emphasis on development of practical and applied skills, research and work experience opportunities, make this program distinctive from those offered by other institutions.

h) Name, title, phone number and e-mail address of the institutional contact person in case more information is required.

Jane Hobson, Ph.D., Chair, Dept. of Biology, Faculty of Science.
Jane.hobson@kwantlen.ca
604 599 2661

Greg Harris, M.Sc., Instructor, Dept. of Biology, Faculty of Science.
Greg.harris@kwantlen.ca
604 599 2481

Part 2 – Degree Content

Aims, goals, and or objectives of the proposed program

The BSc in Biology builds upon the existing Associate of Science Degree. It will function as a foundation from which the Science Faculty will be able to expand further science degree options and program initiatives in coming years.

The program will provide students with a strong foundation in both theoretical and practical aspects of modern biological science. It will emphasize the interdisciplinary nature of biological inquiry and address relevant societal issues in this field. Students graduating with this degree will be prepared for entry into graduate studies programs, teaching certification programs, and health professional programs in Canada. Furthermore, it will provide graduates with the practical skills required for immediate entry into the workforce as, for example, a science or medical technician.

Anticipated contribution of the proposed program to the mandate and strategic plan of the institution

Kwantlen's Mission and Mandate Statement identifies five key objectives for our institution: Access, Scholarship, Community, Mentorship and Stewardship. The BSc in Biology will directly address institutional priorities, including Kwantlen's Mission and Mandate, in the following ways:

- It capitalizes on current high student enrolments in biology courses, providing continuity of study for students wishing to pursue a science degree. In doing so, it will play a significant role in retaining student enrolments while also serving the needs of the community by allowing students to complete desired programs of study without having to travel to more distant institutions.
- Kwantlen's small class sizes make it ideally suited to provide increased access for, and retention of, historically under-represented groups.
- To support environmental stewardship, the proposed degree program incorporates Conservation Biology as a required course in its third year.
- The curriculum provides a solid grounding in scientific principles and has a strong focus on applied learning where practical skills, methodology, research, and problem solving techniques are integral components of coursework. It will thus serve to strengthen Kwantlen's credibility and recognition as a polytechnic institution and raise its profile both locally and regionally as a truly distinctive university.
- It will provide laddering opportunities, flexibility of part-time study and multiple entry and exit points.
- It offers a distinctive program based on small classes and a skills-based, lab-intensive curriculum containing a core research component. These program qualities will attract additional students from the broader community and will enhance Kwantlen's status, both as a receiving institution committed to providing accessible and applied learning programs, and as a student-centred university.
- Provide opportunities for students to actively engage in research and to gain community/industry based work experience through a Co-op Education Program. This will serve to enhance student confidence and competitiveness when entering the workforce.
- The foundational broad-based degree program caters to the needs of a wide spectrum of students and will provide a greater number of employment opportunities and post-graduate options than a more specialized science degree could offer.
- The proposed degree will embody Kwantlen's core values of exploration (through an emphasis on laboratory skills and practical experience), excellence and integrity (through our faculty's continuing commitment to innovation and excellence in teaching) and community (by providing opportunities for degree level qualifications and community-based research projects).

Linkages between the learning outcomes and the curriculum design, an indication whether a work experience/work place term is required for degree completion, and if so a description of the purpose and role of the work experience within the program

The program is designed to provide an intimate, hands-on learning environment that will allow students to employ acquired knowledge in application of the scientific method to the exploration of questions and problems. The curriculum is structured so that the first two years provide students with foundational knowledge and skill sets in chemistry, physics and mathematics that are complementary to the biology courses. The upper level courses will allow students to draw on this knowledge to explore more advanced concepts in biology and to use more sophisticated techniques as they investigate complex questions. At each step, the small class size and integration of laboratory skills with course content material will allow the individual student to more fully expand his/her expertise. The learning outcomes for each course will build on the skills and knowledge the students will have acquired in previous courses in the program. The intimate environment, emphasis on laboratory skills, and close links between theory and practice will be of particular advantage to students. In the fourth year, each student will have developed the expertise required to explore one specific problem or question in depth.

The 4th year Directed Study/Research project may be conducted in the field, in the laboratory, or in association with external organizations. Community/industry affiliations will be a major theme of these projects and will provide opportunities for students to apply their skills.

The BSc in Biology offers an optional Co-op Education Program for students. This program will provide students with work experience options in association with external community/industry organizations.

These innovative and applied components of the degree program will enhance Kwantlen's polytechnic designation by incorporating relevant practical elements that will further distinguish this Biology degree from those offered by other institutions. They will also expand the range of experience and skills of graduates, enhancing their employability in the workforce.

The curriculum in this program is thus designed to provide graduates with the confidence, skills and experience to make informed choices in order to fulfill a productive role in their community.

Potential areas/sectors of employment for graduates and/or opportunities for further study

Students who complete the program will exit with a BSc in Biology. These students will have acquired well developed communication, problem solving, and research skills, a broad-based understanding of biology as an interdisciplinary science, practical and marketable laboratory skills, and a cognisance of the importance of biology in present-day society. Because of its broad foundation, and depending on their elective selections, students with a Kwantlen BSc in Biology will be eligible to compete for entry into any Canadian health professional program, graduate studies programs, or teacher certification program.

In the workplace, students will be prepared for a diverse range of employment opportunities in fields such as Marine Biology, Environmental Impact Assessment, Fisheries, Wildlife and Habitat Conservation, Genomics, Proteomics, Molecular Biology, the pharmaceutical industry, the biotechnology industry and the consulting industry (environmental and technical). In the public sector, graduates may find jobs

within the municipal, provincial and federal governments, and at universities, colleges, and secondary schools.

Delivery methods

The program structure allows for both full and part-time studies. Some evening courses are and will continue to be offered at 1st year level.

First and second year courses will continue to be offered on both Surrey and Richmond campuses, providing both communities with entry options. Because of the requirement for new lab facilities, all upper level courses will be offered on one campus only.

Course offerings will utilize a range of delivery methods. Most of the science courses at both lower and upper level will be delivered in a lecture/lab format focused on the development of practical and problem solving skills. Some courses will be offered in a lecture format only, while the directed studies and research courses will offer individualized guidance and instruction.

Developers of the new courses required for this degree will be encouraged to explore on-line and mixed-mode delivery methods where this is perceived to be feasible and appropriate.

Program strengths

As a teaching-focused university, Kwantlen's educational culture is characterised by faculty commitment to learning success that utilizes innovative teaching styles, small class sizes, hands-on learning experiences, state-of-the-art resources and academic support facilities to increase learner engagement.

The proposed Major in Biology and Minor in Biology programs place a strong emphasis on laboratory work, undergraduate research and Co-op Education Program to produce graduates with a spectrum of scientific investigative skills, making them attractive candidates to potential employers and thus equipping them with a competitive edge in the job market.

Establishment costs are minimized by utilizing the existing two year Associate of Science Degree in Biology as a foundation to build upper level Biology courses. The program capitalizes on the current high enrolments enjoyed by existing biology courses and taps into the academic strengths of biology faculty to develop courses and implement the program without extensive hiring of new faculty.

The BSc in Biology shares goals and content with the existing Environmental Protection Technology Program and BSc in Applied Psychology, as well as several other proposed programs including the BSc in Mathematics, the BSc in Health Science and the Bachelor of Horticulture Science. The synergy created between these programs serves to strengthen and support the network of academic infrastructure provided by Kwantlen as a polytechnic institution.

An overview of the level of support and recognition from other post-secondary institutions, and relevant regulatory or professional bodies, where applicable, and plans for admissions and transfer within the British Columbia post-secondary education system

The proposed BSc in Biology degree program has received recognition and support from several post-secondary institutions in the lower mainland. These institutions acknowledge the growing demand in the workforce for graduates who are skilled in the life sciences.

The BSc in Biology program is intended to retain students while allowing multiple access points and the flexibility for students to transfer to and from other degree programs within Kwantlen. It also provides opportunities for adult learners to re-skill and update their qualifications.

Students from other institutions and programs of study are eligible to transfer into the Biology Degree Program at any time (see Kwantlen Policy B.15) providing that they meet all course prerequisite requirements (see Appendix A – Course Calendar Descriptions). Students with alternate forms of relevant experience may request a PLA assessment. Entry at 3rd year level also requires the completion of a minimum of 60 credits of post-secondary courses with a combined GPA of 2.7 or higher.

Students may successfully exit the program at the end of 2nd year with an Associate of Science Degree in Biology. They will also qualify for transfer into other existing or proposed degree programs such as the BSc in Health Science degree, or may be eligible for admission into some health professional schools such as pharmacy.

To receive a BSc in Biology, students must satisfy Kwantlen's residency requirements as well as the conditions specified by Kwantlen's BSc Framework.

Related programs in the institution or other British Columbia post-secondary institutions. Indicate rationale for duplication, if any.

Most post-secondary institutions offering BSc degrees in British Columbia, offer a Biology Major. However, Kwantlen's proposed Major in Biology and Minor in Biology programs place a strong emphasis on small class sizes, laboratory work and undergraduate research, assets not often available at larger universities. This hands-on experience combined with the Co-op program will afford students practical skills and self-confidence as they progress through the program and will also make our students highly employable after graduation. The proposed program intends to satisfy the needs of the student community and address institutional priorities by offering a foundational baccalaureate degree program in a field which is underrepresented within the institution and the regional community. The program also serves to accommodate the expected future demand for graduates with a BSc in Biology.

Curriculum Design

List the required courses, and indicate which courses are new/to be developed.

BSc Major in Biology - Program and Course Requirements

- Students must satisfy the prerequisite requirements for all courses and comply with Kwantlen's BSc Framework requirements.
- A minimum of 12 upper level Biology courses are required for a BSc Major in Biology. There are 11 specified upper-level Biology courses, including four in 4th year. Students are **required** to select one BIOL 3XXX or 4XXX course from the Science Electives list below as their prescribed 3rd year Biology Elective. A maximum of five additional electives may be chosen from this list.
- In addition to the above course requirements, students will complete 6 credits of Research or Directed Studies in 4th year.
- The total no. of credits for a BSc Major in Biology will exceed 120 but will vary depending upon the elective options chosen.
- A minimum of 18 credits of breadth electives must be chosen to comply with the general education requirements of the Kwantlen BSc Framework. Students must select at least one upper level breadth elective.
- Students may have the option of participating in the Co-op program.

BSc Minor in Biology - Program and Course Requirements

- Students enrolled in a BSc Minor in Biology must do so in association with another Major or Minor program.
- In addition to satisfying all requirements of the Kwantlen BSc Framework, students must satisfy all course prerequisite requirements.
- Students must complete a minimum of 6 upper level Biology courses (BIOL) numbered 3000 or higher including at least 2 courses numbered 4000 or higher.
- A minimum of 2 upper level Biology courses with a lab component must be selected.
- Students enrolled in a Minor are not eligible for the Directed Studies or Research courses in 4th year.
- A minimum of 18 credits of breadth electives must be chosen to comply with the general education requirements of the Kwantlen BSc Framework. Students must select at least one upper level breadth elective.

Course titles *in italics* indicate a new course that is under development or must be developed.

YEAR 1

Fall

BIOL 1110 CR-4 Introduction to Biology I
CHEM 1110 CR-4 The Structure of Matter

PHYS 1101 CR-4 Physics for Life Sciences I
MATH 1112 CR-3 Pre-Calculus Algebra
OR MATH 1130 CR-3 Calculus for Life Sciences I
ENGL 1100 CR-3 Writing, Reading and Thinking:
An Introduction
COOP 1101 CR-1 Job Search Techniques

Spring

BIOL 1210 CR-4 Introduction to Biology II
CHEM 1210 CR-4 Chemical Energetics and
Dynamics
PHYS 1102 CR-4 Physics for Life Sciences II
MATH 1130 CR-3 Calculus for Life Sciences I
OR MATH 12XX
ENGL 12XX

YEAR 2

Fall

BIOL 2322 CR-4 Ecology
BIOL 2321 CR-4 Cell Biology
CHEM 2320 CR-4 Organic Chemistry I
Elective
Elective

Spring

BIOL 2320 CR-4 Genetics
BIOL 2421 CR-3 Cellular Biochemistry
CHEM 2420 CR-4 Organic Chemistry II
Elective
Elective

YEAR 3

Fall

BIOL 3XXX CR-4 Animal Behaviour
BIOL 3XXX CR-4 Advanced Cell and Molecular Biology
BIOL 3XXX CR-3 Conservation Biology
BIOL 3XXX CR-3 Biometrics
Elective

Spring

BIOL 3XXX CR-4 Molecular Genetics
BIOL 3XXX CR-4 Zoology
BIOL 3XXX CR-4 Botany
Biology Elective
Elective

YEAR 4

Fall

BIOL 4XXX CR-4 Animal Physiology
BIOL 4XXX CR-3 Evolutionary Biology

BIOL 4XXX CR-3 Directed Studies I
OR
BIOL 4XXX CR-3 Research Project I

Elective
Elective

Spring

BIOL 4XXX CR-3 Marine Biology
BIOL 4XXX CR-4 Developmental Biology

BIOL 4XXX CR-3 Directed Studies II
OR
BIOL 4XXX CR-3 Research Project II

Elective

SCIENCE ELECTIVES

BIOL 2330 CR-4 Microbiology I
BIOL 3XXX CR-4 Microbiology II
BIOL 3XXX CR-3 Biological Boundaries
BIOL 3XXX CR-3 Human Genetics
BIOL 3XXX CR-3 Molecular Biochemistry

BIOL 31XX CR-4 Human Anatomy and Physiology I¹
BIOL 42XX CR-4 Human Anatomy and Physiology II¹
BIOL 43XX CR-4 Human Anatomy and Physiology III¹
BIOL 44XX CR-4 Human Anatomy and Physiology IV¹

CHEM 3310 CR-4 Physical Chemistry
CPSC 1100 CR-3 Computer Science
PHYS 3202 CR-4 Biophysics
PHYS 3500 CR-3 Summer Field School

See Appendix A – Course Calendar Descriptions and Prerequisites.

Program Delivery

Explain the learning methodology/methodologies to be used.

The courses in this program were designed with learning methodologies that ensure the development of self-directed learners who function well in environments requiring expertise in science. Starting in the first year, the program is structured to provide opportunities for students to be actively engaged in mastering the content and implementing the scientific method. Heavy emphasis is placed on development of inquiry/ lab based skills and application of these skills to problem solving. Central to this is a lecture/lab framework that provides experiences with scientific inquiry, problem-solving, group work, library research, oral presentations and techniques directly applicable to industry and graduate labs.

It is intended that the student will be exposed to problems of increasing scope and complexity requiring application of knowledge and skills acquired in previous courses. Thus the upper level courses allow the students to work with scientific methods/topics at an integrated level, using the skills and knowledge acquired in the first two years. This progression culminates with the 4th year Research/Directed Studies course in which each student will use their knowledge and skills to explore problems /questions relevant to the community.

Providing the hands-on experience central to this type of education is made possible by the smaller class sizes and appropriate environments of the lab, field and community. These provide experiences which not only transfer knowledge and skills but also build self confidence and self motivation. These are highly regarded attributes desired by potential employers in the workforce.

Once established, each component of the program will be examined to consider the feasibility and appropriateness of on-line and mixed mode delivery methods.

¹ These courses are to be developed by the Health Science degree.

Admission Requirements

Describe the admission requirements for this program.

In addition to satisfying the university entrance requirements, students entering 1st year will need to meet the following program entrance requirements:

- A grade of B or better in English 12 or equivalent
- A grade of C+ or better in Chemistry 12 or equivalent
- A grade of C or better in Principles of Mathematics 12 or equivalent
- A passing grade in Physics 12 or equivalent, or in PHYS 1100, or a grade of B or better in Physics 11

A passing grade in Biology 11 or 12 is recommended for students wishing to pursue the proposed BSc in Biology, but it is not required. This is consistent with current practice.

Appropriate qualifying courses are available at Kwantlen for students who do not meet these requirements. Students may also request a prior learning assessment as per Kwantlen Policy B.14, Credit for Prior Learning.

Students who have completed an Associate of Science Degree in Biology at Kwantlen are eligible to ladder directly into 3rd year of the Biology Degree Program. Students from other institutions and programs of study are eligible to transfer into the Biology Degree Program at any time (see Kwantlen Policy B.15) providing that they meet all course prerequisite requirements (see Appendix A – Course Calendar Descriptions). Students with alternate forms of relevant experience may request a PLA assessment. Entry at 3rd year level also requires the completion of a minimum of 60 credits of post-secondary courses with a combined GPA of 2.7 or higher.

Faculty

a) *List the faculty and their areas of specialization.*

Name	Degree	Area of Specialization
Ann Marie Davision	BSc(hon), PhD	Genetics
Leah DeBella	BA, MSc, PhD	Genetics
Gregory Harris	BSc, Dip Ed, MSc	Physical Geography, Ecology Conservation Biology
Jane Hobson	BSc, MSc, PhD	Cell Biology, Pathology
Patricia McDonald	BSc, MSc, PhD	Zoology, Ethology
Andrea Sussman	BSc, PDP, MSc, PhD	Marine Biology, Marine Benthic Ecology
Pat Thomas	BSc, PDP, MA, MSc	Cell Biology, Immunology, Environmental Education
Douglas Torrance	BSc, MSc	Behavioural Ecology
Carl Whitney	BSc, MSc, PhD	Botany, Animal Behaviour, Ecology
Sherry Wilson	BSc, MSc, PhD	Plant Molecular Biology

b) *In an appendix, provide the list of faculty along with a brief curriculum vitae for each.*

See Appendix B - Faculty Curriculum Vitae.

Program Resources

a) *Describe the resources that will be required to mount this program including:*

Library resources

The Library supports the development and implementation of this degree. Library Impact Assessments have been conducted for the new BSc Major in Biology and Minor in Biology program to establish budgetary and purchasing priorities that will be met in order to support new courses in development. Biology databases, online journals and book acquisitions, will be required.

Computer and computer access

Computers will be required for new laboratories, each with Kwantlen network and internet access for students to complete coursework and research. New software will also be needed for some of the proposed courses.

Classrooms, laboratories and equipment

Two new laboratories, each with a prep. room will provide adequate lab facilities to serve the proposed 3rd and 4th year courses of this program and also allow opportunities for student research and the future expansion of course offerings. The two new labs will require specialized equipment for the 3rd and 4th year courses listed under Curriculum Design.

Existing and shared resources at the institution or at other institutions that will be used to offer the program

All lower level science courses in this program are shared with the existing Associate of Science Degree Programs. Some upper level courses and their associated laboratory and equipment resources will be shared with the existing BSc in Applied Psychology program, the proposed BSc in Health Science and the approved Bachelor of Nursing programs.

Additional resources that will be required to offer this program.

In some instances, resources associated with external organizations may be required for students engaged in Co-operative Education and 4th year research projects. Such opportunities will serve to enhance the employability of program graduates.

b) *Provide the intended implementation schedule for the new program and evidence of the appropriateness of the schedule, given the timing of the proposal and readiness of the institution to offer the program.*

The first two years of this program already exist as an Associate of Science Degree in Biology. Year 1 is scheduled for implementation in September 2011. This allows a two year period for the design and construction of new lab facilities, the sourcing and purchasing of specialized lab equipment and the development of new upper level course offerings. Third year courses will be offered in September 2013.

Program Consultation

a) *Provide a list and brief explanation of the nature of the consultations that have occurred in the development of the degree program.*

The development of the proposed degree program included extensive internal consultations within the institution including the setting up of a special Task Force to explore degree initiatives.

The Full Program Proposal for the BSc in Biology has been forwarded to the following list of external contacts for their appraisal.

- Dr. Paul Harrison, Dean of Science, University of British Columbia, BC.
- Dr. Michael Plischke, Dean of Science, Simon Fraser University, BC.
- Dr. David Ng, Senior Instructor, Advanced Molecular Biology Lab, Michael Smith Laboratories, UBC.
- Dr. Lesley Esford. National Research Council, Vancouver, BC.
- Dr. Cathie Garnis. BC Cancer Council.
- Cindy Mazerolle, Program Head, Cardiac Sciences, BCIT.

See Appendix C – Letters of Support.

Bachelor of Science in Biology - Appendices

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APPENDIX A

Course Calendar Descriptions and Prerequisites

Course titles *in italics* indicate a new course that is under development or must be developed. Non-biology electives are excluded.

Year 1 – Fall

BIOL 1110 CR-4 Introduction to 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.

CHEM 1110 CR-4 The Structure of Matter

Students will study the modern view of atomic structure, nuclear chemistry, theories of bonding and molecular structure, organic chemistry (properties and reactions of the major functional groups and isomerism) after a brief review of stoichiometry, gases and the treatment of experimental data. Students will also perform experiments in the laboratory.

Prerequisites: (CHEM 1105 or [Chemistry 12 with a C+]) and (MATQ 1093 or MATH 1093 or 1117 or ABEM 0011 or 0082 or MATP 1011 or PSPM 1082 or [Principles of Mathematics 12 with a C] or [Principles of Mathematics 12 with a P plus Placement Test])

Corequisites: MATH 1112 or (MATH 1111 and 1113) is strongly recommended

PHYS 1101 CR-4 Physics for Life Sciences I

Students will learn about translational and rotational kinematics and dynamics; simple harmonic motion, waves and sound; work, power, energy, and momentum with linear, rotational and oscillatory motion; fluids; and heat. They will use computers extensively in the lab for data collection and analysis.

Prerequisites: PHYS 1100 or Principles of Physics 12 (P or better) and Principles of Mathematics 12 with a C.

MATH 1112 CR-3 Pre-Calculus Algebra

Students will study the concept of function in depth. In particular they will study polynomial, rational, exponential, logarithmic and trigonometric functions, and their graphs.

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 Test; 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

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)

COOP 1101 CR-1 Job Search Techniques

Students will learn the philosophy and goals of co-operative education. They will also learn to develop effective job search techniques, including preparing effective resumes and cover letter, and practicing interview skills, in order to secure their first co-op placement.

Year 1 – Spring

BIOL 1210 CR-4 Introduction to 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.

Prerequisite: BIOL 1110

CHEM 1210 CR-4 Chemical Energetics and Dynamics

Students will learn about topics including liquids, solids and solutions, a review of redox reactions, electrochemistry, the laws of thermodynamics, equilibrium, acids and bases, ionic equilibria, and chemical kinetics. They will also perform experiments in the laboratory.

Prerequisites: CHEM 1110 and ([MATH 1112 or higher level] or [MATH 1111 and 1113] or [Principles of Mathematics 12 with a B])

PHYS 1102 CR-4 Physics for Life Sciences II

Students will learn about electrostatic forces and fields; magnetic forces, fields, and induction; AC circuits; wave optics; quantum and atomic physics; and radioactivity. They will use computers extensively in the lab for data collection and analysis.

Prerequisites: PHYS 1101 or PHYS 1120

Corequisites: MATH 1120 or 1130

MATH 1130 CR-3 Calculus for Life Sciences I

Students will study differential calculus and its applications to biological sciences. In particular, they will study limits and differentiation of algebraic and elementary transcendental functions, with applications to graphing, optimization, and growth and decay.

Prerequisites: MATH 1112 or (MATH 1111 and 1113); or Principles of Mathematics 12 with a C+ or better; or Principles of Mathematics 12 with a C plus Mathematics Placement Test

Year 2 – Fall

BIOL 2322 CR-4 Ecology

Students will learn the basic properties of ecosystem, community and population ecology, including energy transfer, mineral cycling, community structure and dynamics, competition, predation, evolution and population dynamics. They will also perform lab and field work.

Prerequisites: BIOL 1110 and 1210

BIOL 2321 CR-4 Cell Biology

Students will examine the ultrastructure of the eucaryotic and prokaryotic cell along with molecular activities associated with these structures. They will also identify and understand the experimental techniques and data that support the current view of cell structure and function. Students will develop considerable skill in the preparation of materials for microscopic examination.

Prerequisites: BIOL 1110 and 1210 and CHEM 1110

CHEM 2320 CR-4 Organic Chemistry I

Students will study the fundamental aspects of modern organic chemistry as illustrated by the structure, physical and spectroscopic properties and reactions of alkanes, cycloalkanes, alkenes, dienes, alkynes, halogen compounds, alcohols, ethers, aldehydes and ketones. They will also perform experiments in the laboratory.

Prerequisites: CHEM 1210 (or CHEM 1110 with a B or better)

Year 2 – Spring

BIOL 2320 CR-4 Genetics

Students will examine the principles of heredity, transmission of traits, exchange of genetic information, mutation, linkage, gene action and recombinant DNA technology, with emphasis on problem solving. They will acquire a variety of laboratory skills including sterile techniques, isolation of DNA, electrophoresis and photo microscopy.

Prerequisites: BIOL 1110 and 1210

BIOL 2421 CR-3 Cellular Biochemistry

Students will learn the patterns and reactions of cellular metabolism with particular attention to the structure and function of proteins, the mechanisms of reactions, and the interrelationships and control of catabolism and anabolism.

Prerequisites: BIOL 1110 and 1210 and 2321 and CHEM 2320

Corequisite: CHEM 2420

CHEM 2420 CR-4 Organic Chemistry II

Students will study the structure and reactions of aromatics, polycyclic aromatic and heteroaromatic compounds, and their enolates, and an introduction to the chemistry of fats, carbohydrates and proteins. They will also perform experiments in the laboratory. Note: This course is a continuation of CHEM 2320.

Prerequisites: CHEM 2320

Year 3 – Fall

BIOL 3XXX CR-4 Animal Behaviour

Students will be introduced to the scientific study of animal behaviour, with special emphasis on the evolutionary and ecological aspects of behaviour. They will learn about the basic methodology employed in behavioural studies in both seminars and lab/field activities. They will explore the adaptive nature of behaviour through examination of various topics, including mating systems, sexual selection, foraging, competition and social groups.

Prerequisites: BIOL 1110, 1210 and BIOL 2322

BIOL 3XXX CR-4 Advanced Cell and Molecular Biology

Students will study advanced topics in molecular cell biology including: molecular biology of cell signaling, immunology, cell cycle regulation, apoptosis, and cancer. Students will be required to read and interpret current publications in these subject areas. They will employ advanced cell and molecular techniques such as Western Blot analysis, Fluorescence microscopy, cell culture, and immunohistochemical staining in the laboratory portion of the course.

Prerequisites: BIOL 1110, 1210, and 2321, CHEM 2320 and 2420.

BIOL 3XXX CR-3 Conservation Biology

Students will examine the science, politics and non-government organization activities relating to topical issues in conservation biology on a local, regional and global scale. They will focus on invasive species, endangered species, pollutants, habitat fragmentation, global warming, government regulation, wildlife biology and sustainable ecosystems. Students will explore these issues further in the field component of the course.

Prerequisites: BIOL 1110, 1210 and BIOL 2322

BIOL 3XXX CR-3 Biometrics

Students will study concepts of statistical hypothesis-testing and research design. They will learn parametric and non-parametric procedures for testing one-sample, two-sample and multi-sample hypotheses. They will acquire skills in data analysis using computer software.

Prerequisites: 30 credits of lower level science courses including BIOL 1110 and 1210 and MATH 1130.

Year 3 – Spring

BIOL 3XXX CR-4 Molecular Genetics

Students will learn mechanisms of gene regulation in eukaryotes. They will study the fundamentals of genomics. They will learn the theory underlying the most commonly used molecular biology laboratory techniques. Students will conduct experiments using molecular biology techniques including bacterial plasmid transformation, gel electrophoresis and PCR in the laboratory portion of the course.

Prerequisites: BIOL 2320, 2320, 2421

BIOL 3XXX CR-4 Zoology

Students will study theories regarding evolutionary origins of animals, the fossil evidence of the Cambrian explosion and the Cretaceous-Tertiary extinction event. Students will survey select extant

invertebrate phyla with an emphasis on ecological niche diversity, and they will survey the extant Vertebrata classes with emphasis on functional morphology and evolutionary relationships.

Prerequisites: BIOL 1110, 1210, 2322

BIOL 3XXX CR-4 Botany

Students will study the structure, function, classification and systematics of plants. They will learn about the evolutionary origins and adaptational trends of plants. They will acquire skills in plant identification and in designing and carrying out observational and experimental studies of plant biology.

Prerequisites: BIOL 1110, 1210, 2322

Year 4 – Fall

BIOL 4XXX CR-4 Animal Physiology

Students will study the basic physiology of animals by learning about the structural components and mechanisms of operation, regulation and integration of major body systems of both vertebrates and invertebrates. Students will develop practical skills with a focus on vertebrate animals in the laboratory portion of the course.

Prerequisites: BIOL 2321, 2421, BIOL 3XXX (Zoology), PHYS 1101, 1102,

BIOL 4XXX CR-3 Evolutionary Biology

Students will study the principles of evolutionary biology by examining key processes and evolutionary patterns in major taxonomic groups that enable biologists to account for the observed diversity of life. Students will study the following topics: phylogeny; biogeography; natural selection, sexual selection and adaptation; divergent, parallel and convergent evolution; speciation and hybridization; rates of morphological and physiological change; evolution of life histories; the genetic basis of evolution; optimality theory; biodiversity, conservation and evolution.

Prerequisites: BIOL 2321, 2421, 2320, 2322, 3XXX (Zoology)

BIOL 4XXX CR-3 Directed Studies I

Students will design and conduct a specific biological project under the direction of an instructor in the Biology Department or an off-campus supervisor approved by the Department. They will present the design and preliminary results of the project in the form of a detailed written report.

Prerequisite: Completion of third year of Biology BSc major and permission of instructor.

BIOL 4XXX CR-3 Research Project I

Students will conduct a biological research investigation under the direction of an instructor in the Biology Department or an off-campus supervisor approved by the Department. They will present the experimental design and preliminary results of the study in a Departmental seminar.

Prerequisite: Completion of third year of Biology BSc major and permission of instructor.

Year 4 – Spring

BIOL 4XXX CR-3 Marine Biology

Students will study the diversity of marine habitats in B.C. including a survey of invertebrates, macroalgae, plankton and marine mammals and birds. Students will focus on intertidal community ecology and sampling methodology. Students will also study aquaculture, invasive species and the salmon fishery.

Prerequisites: BIOL 2322, 3XXX (Zoology, Botany)

BIOL 4XXX CR-4 Developmental Biology

Students will examine the development of an organism from patterning of the embryo and generation of the correct number of cells, to cell fate determination, differentiation, and morphogenesis. They will learn about classical embryology and modern genetic approaches necessary to understand the molecular mechanisms regulating embryonic development. Students will learn practical skills associated with these classical and modern techniques in the laboratory portion of the course.

Prerequisites: BIOL 2321, 2320, 2421, 3XXX (Advanced Cell and Molecular Biology, Molecular Genetics)

BIOL 4XXX CR-3 Directed Studies II

Students will continue with the project initiated in Directed Studies I. They will present the results of the project in the form of a detailed written report.

Prerequisite: *Directed Studies I*

BIOL 4XXX CR-3 Research Project II

Students will continue the investigation initiated in Research Project I. They will present the results of the investigation in a departmental seminar and in a scientific paper written according to the guidelines of an appropriate research journal.

Prerequisite: *Research Project I*

Biology Electives

BIOL 2330 CR-4 Microbiology I

Students will study a variety of microorganisms including bacteria, fungi, algae, protozoa, and viruses. They will examine several aspects of microorganisms, including diversity, structure and function, metabolism, growth, reproduction and genetics.

Prerequisite: BIOL 1110 and 1210

Corequisite: CHEM 1110

BIOL 3XXX CR-4 Microbiology II

Students will examine the applied and environmental roles of a variety of microorganisms. Students will study host/parasite interactions, food microbiology, immunity, epidemiology, biogeochemical cycling, waste-water treatment, bioremediation, biotechnology and genetically modified organisms.

Prerequisites: BIOL 2321, 2330

BIOL 4XXX CR-3 Human Genetics

Students will study several human genetic diseases, including examples of single gene inheritance (both dominant and recessive mutations) and multifactorial traits. Students will investigate the nature of the diseases at the biochemical, cellular and organismal level. Students will also learn how epigenetic, such as imprinting, can affect disease inheritance. They will study emerging fields of human genetics including pharmacogenomics.

Prerequisites: BIOL 2321, 2320,

BIOL 3XXX CR-3 Molecular Biochemistry

Students will study the structure, function and metabolism of lipids, steroids, amino acids and nucleotides. Students will also expand their knowledge of the biochemistry and molecular biology of replication, transcription and gene regulation.

Prerequisites: BIOL 2321, BIOL 2421, CHEM 1210, 2320, 2420.

BIOL 4XXX CR-3 Biological Boundaries

Students will participate in a seminar course in which they will examine current advances in a range of applied biological fields with emphasis on primary research literature. Students will explore topics such as transgenic organisms, biological control, biofuels, nanotechnology, toxicology and bioremediation.

Prerequisites: Completion of 3rd year of Biology BSc.

BIOL 31XX CR-4 Human Anatomy and Physiology I

Students will learn basic properties of human tissue types and organs including an overview of human homeostasis involving fluid and electrolyte balance, endocrine and nervous system control. Students will also explore the basic principles of pharmacology and pathology. Students will then apply these basic principles to a study of the integumentary system and selected disorders and drug actions related to this system. Students will practice state-of-the-art techniques related to the topics covered in the course, including histology, electrolytes, and nerve impulse conduction in the laboratory portion of the course.

Prerequisites: BIOL 2321 and BIOL 2421 and CHEM 2420.

BIOL 42XX CR-4 Human Anatomy and Physiology II

Students will study the human skeletal, muscular, cardiovascular and respiratory systems along with selected disorders and drug actions related to these systems. Students will employ state of the art techniques related to the human skeletal, muscular, cardiovascular, and respiratory systems in the laboratory portion of this course.

Prerequisite: BIOL 31XX

BIOL 43XX CR-4 Human Anatomy and Physiology III

Students will study the human urinary, digestive and nervous systems and selected disorders and drug actions related to these systems. Students will employ state of the art techniques related to the human urinary, digestive and nervous systems in the laboratory portion of this course.

Prerequisite: BIOL 31XX

BIOL 44XX CR-4 Human Anatomy and Physiology IV

Students will study the human immune and reproductive systems and human embryology. Students will learn selected disorders and drug actions related to these topics. Students will employ state of the art techniques related to the human immune and reproductive systems and embryology in the laboratory portion of this course.

Prerequisite: BIOL 31XX

APPENDIX B

Faculty Curriculum Vitae

ANN MARIE DAVISON (née HOWELL)

EDUCATIONAL BACKGROUND

Degree	Institution	Field of Study	Year
B.Sc.(Hons)	Simon Fraser University	Biochemistry	1983
Ph.D.	University of British Columbia	Genetics	1989

TEACHING EMPLOYMENT HISTORY

Position Held	Dates	Department	Institution	Topic
Instructor	08/96 – Present	Biology	Kwantlen Polytechnic University	Genetics and General Biology
Sessional Lecturer	1996 – 1999	Biochemistry	University of British Columbia	Biochemistry (BIOC 300)
Temporary Faculty	08/96 – 05/98	Biology	Langara College	General Biology
College Professor	09/95 – 04/96	Biology	Okanagan University-College	Genetics and General Biology
Instructor	01/95 – 04/95	Biology	Kwantlen University-College	Genetics
Teaching Assistant	09/94 – 12/94	IMBB	Simon Fraser University	Molecular Biology/Biochemistry
Course Coordinator	09/93 – 08/94	Botany	University of British Columbia	Genetics
Sessional Lecturer	1993 – 1997	Extrasessional Studies	University of British Columbia	Genetics

RESEARCH EXPERIENCE

Position Held	Dates	Department and Institution
Research Associate	09/91 – 09/92	Institute of Molecular Biology and Biochemistry Simon Fraser University
Postdoctoral Research Fellow	06/89 – 06/91	Basic Sciences Division Fred Hutchinson Cancer Research Center Seattle, WA

AWARDS AND HONOURS

- Canadian Medical Research Council Fellowship (1989–1991)

- National Sciences and Engineering Council Fellowship (1989) declined
- Canadian Medical Research Council Studentship (1985–1989)
- IODE Graduate Scholarship (1985) declined
- University Graduate Fellowship (1984)

Leah R. DeBella
Biology Department
Kwantlen Polytechnic University
leah.debella@kwantlen.ca

Education

- *Ph.D.*, Genetics, University of California, Davis, December 2004.
Dissertation: Analysis of genes required for spindle positioning in the early *C. elegans* embryo. Advisor: Dr. Lesilee S. Rose.
- *M.Sc.*, Genetics, University of British Columbia, August 1998.
Thesis: Sequencing regions adjacent to *BssHII* sites on Human Chromosome 8: a method of gene identification. Advisor: Dr. Stephen Wood.
- *B.A.*, Biology, Sonoma State University, California, August 1995.

Academic Positions

- *Instructor*, Kwantlen Polytechnic University, 2005-2010.
- *Instructor*, Vancouver Community College, 2007-2009.
- *Instructor*, Sacramento City College, 2003-2004.
- *Teaching Intern*, Sacramento City College, 2003.
- *Teaching Assistant*, University of California, Davis, 1999 - 2004.
- *Research Assistant*, University of California, Davis, 1997-2004.
- *Teaching Assistant*, University of British Columbia, 1996.
- *Research Assistant*, University of British Columbia, 1995-1997.

Scholarships and Awards

- *Dissertation Fellowship*, UC Davis, 2002-2003.
- *Schwall Dissertation Fellowship in Medical Research*, UC Davis, 2002-2003.
- *Summer Research Fellowship*, UC Davis, 2003.
- *GSA Graduate Student Travel Grant*, UC Davis, 2000.
- *Jastro-Shields Graduate Research Scholarship*, UC Davis, 1999-2002.
- *NIH Molecular and Cellular Biology Training Grant Fellowship*, UC Davis, 1999-2001.
- *Earl C. Anthony Fellowship*, UC Davis, 1997-1998.

Publications

- Li W, DeBella LR, Guven-Ozkan T, Lin R, Rose LS. An eIF4E-binding protein regulates katanin protein levels in *C. elegans* embryos. *Journal of Cell Biology* 2009;187:33-42.
- DeBella LR, Hayashi A, McNally F, Rose LS. *LET-711*, the *Caenorhabditis elegans* NOT1 ortholog, is required for Spindle Positioning and Regulation of Microtubule Length in Embryos. *Molecular Biology of the Cell* 2006 Nov;17(11):4911-4924.
- Tsou MF, Hayashi A, DeBella LR, McGrath G, Rose LS. LET-99 determines spindle position and is asymmetrically enriched in response to PAR polarity cues in *C. elegans* embryos. *Development* 2002 Oct;129(19):4469-4481.

GREGORY HARRIS

EDUCATION

Bachelor of Science, *U. Sydney, Australia (1978)*. Double major in Zoology and Physical Geography.

Grad. Diploma in Education (Merit), *Wollongong Institute of Education (1979)*.

Master of Science in Behavioural Ecology, *U. Sydney, Australia (1992)*.

EMPLOYMENT

2007 – Present	Biology Instructor	Kwantlen Polytechnic University
1999 – 2006	Biology Lecturer	St. Joseph's College, NSW, Aust.
1997 – 1998	Biology Lecturer	Freeman College, NSW, Aust.
1995 – 1996	Biology Lecturer	St. Charbel's College, NSW, Aust.
1991 – 1994	Biology Lecturer	St. John's College, NSW, Aust.
1990	Biology Lecturer	College of Natural Therapies, NSW, Aust.
1989	Manager	Laperouse Museum, NSW, Aust.
1987 – 1988	Education Officer	National Parks and Wildlife Service, NSW, Aust.
1982 – 1986	Biology Lecturer	St. Patrick's College, NSW, Aust.
1980 – 1981	Biology Lecturer	D.A.V. College, Suva, Fiji

PUBLICATIONS

Harris, Gregory. 1989. Habitat use of wading birds on the Parramatta River. Proc. International Symposium on Wetlands

JANE ELIZABETH HOBSON

EDUCATION

Post- Doctoral	Post Doctoral Fellowship	Pathology	1982 – 1985	UBC Pulmonary Research Lab
Ph.D.	Vanderbilt University	Pathology	1982	Nashville, Tennessee
M.Sc.	University of New Hampshire	Zoology	1972	
B.Sc.	St. Mary's College	Chemistry	1970	Notre Dame, Indiana

HONOURS AND AWARDS

- Parker B Francis Predoctoral Fellowship
- Parker B Francis Postdoctoral Fellowship
- Canadian Lung Postdoctoral Fellowship

WORK EXPERIENCE

<u>Kwantlen University College</u>	Full time Instructor, Biology Department	Spring 1992 - Present
	First year biology (Biology 1110, 1210), Cell and Molecular Biology (2321); Cellular Biochemistry (2421); Biology 1260 (Nursing Anatomy and Physiology)	
<u>BCIT</u>	Part time Instructor, Basic Health Sciences Department	1991-present
<u>Douglas College</u>	Part time Instructor, Biology Department	1991 – 1992
		Anatomy and Physiology 207 (several different courses)
<u>University of NH</u>	Teaching Assistant	1970 – 1972
		General Zoology, Comparative Anatomy, Physiology

RESEARCH

1987 – 1991	Research Associate, UBC Pathology Department Research involved biochemical, <i>in vivo</i> and <i>in vitro</i> cell and tissue studies in pathogenesis of smoking and dust related lung diseases.
1985 – 1987	Research Associate, UBC Pulmonary Research Laboratory Research involved cellular and biochemical studies in pathogenesis of pulmonary vascular diseases.
20010	Inflammatory mediators in Type 2 Diabetes

CLINICAL LABORATORY

1973 – 1976	University Frauenklinik, Freiburg, Germany
1970 – 1973	Wentworth Douglas Hospital, Dover, New Hampshire, USA

PUBLICATIONS

1. Brigham KL, Parker RG, Roselli RJ, Hobson JE and Harris TR . Exchange of macromolecules in the pulmonary microcirculation. Ann. New. York Acad. Sci. 384:246, 1982.
2. Hobson J, Wright JL, Wiggs BR, and Hogg JC. The cellular content of lung lavage in patients with COPD. Am. Rev. Resp. Disease 129(a), 1984.
3. Hart DHL, Hobson J, Autor AP. Antioxidant enzyme content of pulmonary artery endothelial cells: Effects of subculture. J. Free Radicals in Biology and Medicine 1:429, 1985.
4. McKeen CR, Brigham KL, Bowers RE, Harris TR and Hobson J. Saline compared to plasma resuscitation from shock in sheep: lung fluid balance. J. Critical Care. 1:133, 1986.
5. Hobson J, Wright JL, Wiggs RB and Hogg JC. Comparison of the content of lung lavage fluid with the presence of emphysema and peripheral airways inflammation in resected lungs. Respiration 50:1, 1986.
6. Wright JL, Hobson JE, Wiggs RB Pare PD, and Hogg JC. Effect of cigarette smoking on the structure of small airways. Lung 165:91, 1987.
7. Hobson J, Gilks B, Wright JL And Churg A. Effects of exposure to asbestos and cigarette smoke on tracheal explants. J Nat'l Cancer Institute. 80:518, 1988.
8. Wright JL, Hobson J, Wiggs RB, and Hogg JC. Comparison of inflammatory cell in bronchoalveolar fluid with those in the lumen of peripheral airways and alveolar airspace. Lung 166:75-83, 1988.

9. Churg, A, Berean K, Hobson J, Wright JL. Catalase prevents cigarette smoke induced asbestos fibre penetration in rat tracheal explants. *Am J Pathology*, 135:4, 1989.
10. Churg, A, Hobson J, Wright JL. Effects of cigarette smoke dose and time after smoke exposure on uptake of asbestos fibers by rat tracheal epithelial cells. *Am. J. Resp. Cell Mol. Biol.* 3:265, 1990.
11. Hobson J, Churg, A, Wright JL. Active oxygen Species mediate asbestos fiber uptake by tracheal epithelial cells. *FASEB J* 4:3135, 1990.
12. Hobson J, Wright JL, Churg, A. Cigarette smoke causes deposition of hydrogen peroxide on tracheal epithelium. *Am. J. Pathology* 137:35, 1991.

Patricia Ann McDonald

EDUCATION

PhD	University of British Columbia	Behavioural Endocrinology	1983
MSc	University of British Columbia	Animal Behaviour	1976
BSc	University of Toronto	Zoology	1973

AWARDS

McLean Fraser Memorial Fellowship	1979
H.R. MacMillan Family Fellowship	1978
NRC Graduate Scholarship	1977
H.R. MacMillan Family Fellowship	1976
UBC Graduate Fellowship	1975
Ontario Graduate Fellowship	1974
NRC Graduate Scholarship	1974
B.C. Government Scholarship, 1 st class	1970 & 1971
B.c. Hydro Scholarship	1970
UVic President's Scholarship	1970 & 1971

WORK EXPERIENCE

Kwantlen	Full-time instructor, Biology Department Introductory Biology, Nonmajors Biology, Ecology	1989 – present
Langara College	Part-time instructor	1987
Capilano College	Part-time instructor	1985
UBC	Sessional lecturer Summer sessional lecturer	1983-1986 1988, 1989

PUBLICATIONS

McDonald, P.A. 1977. The Influence of photoperiod on male courtship and nest-building in doves. Northwest Comparative Endocrinology Meeting, Friday Harbor, Wash.

McDonald, P.A. 1977. Environmental and hormonal control of reproduction in birds. Invited symposium speaker, Can. Soc. Zool. Meeting, Banff, Alberta.

McDonald, P.A. & Liley, N.R. 1978. The effects of photoperiod on androgen-induced reproductive behavior in male ring doves. *Hormones and Behavior* 10: 85-96.

McDonald, P.A. 1979. Luteinizing hormone-releasing factor (LRF) and reproductive behavior in male doves exposed to long and short photoperiods. *Neuroendocrinology* 28: 151-154.

McDonald, P.A. 1981. Pinealectomy and nesting in male doves (poster paper). XVII International Ethological Conference, Oxford, England.

McDonald, P.A. 1981. The role of aromatization in the control of nesting behavior by daylength. Can. Soc. Zool. Meeting.

McDonald, P.A. 1982. The influence of pinealectomy and photoperiod on courtship and nestbuilding in male doves. *Physiology and Behaviour* 29: 313-318.

ANDREA VERA SUSSMANN

EDUCATION

- *Doctor of Philosophy* (Marine Benthic Ecology) Botany Department, University of British Columbia, Vancouver, B.C. Supervisor: Dr. Robert DeWreede. 2000
- *Teacher Certification* (Science, Secondary), U.B.C, Vancouver, B.C. 1987
- *Bachelor of Science* (Marine Biology), U.B.C., Vancouver, B.C. 1985

ACADEMIC and TEACHING EXPERIENCE

- 2007 (June). *Invited Researcher*, University of St. Francis Xavier, Antigonish, Nova Scotia. Seaweed ecology field studies.
- 2004 – present. *Instructor* (Biology 1110/1210), Kwantlen Polytechnic University, Surrey, B.C.
- 2004. *Sessional Instructor* (Biology 104), Capilano College, North Vancouver, B.C.
- 2002 – 2004. *Sessional Instructor* (Biology 121), U.B.C., Vancouver, B.C.
- 2002 – 2004. Postdoctoral Fellow (Marine Benthic Ecology), U.B.C., Vancouver, B.C.
- 2000 – 2001. Postdoctoral Fellow (Seagrass Genetics and Ecology), Universidad Nacional Autonoma de México, México.

PUBLICATIONS

- Sussmann, A.V. and R. E. DeWreede. 2007. Relative contribution of vegetative propagation and sexual reproduction in the maintenance of *Acrosiphonia* (Chlorophyta) populations. *Phycologia*, 46: 79-85.
- Sussmann, A.V. and R. E. DeWreede. 2005. Survival of the endophytic sporophyte of *Acrosiphonia* (Chlorophyta). *J. Mar. Biol. Assoc. U.K.* 85: 1-10.
- Sussmann, A. V., R. Scrosati and R. E. DeWreede. 2005. Seasonal synchrony of a green algal endophyte, *Acrosiphonia* (Chlorophyta) with its red algal hosts, *Mastocarpus* and *Mazzaella* (Rhodophyta). *Phycologia*, 44: 129-132.
- Sussmann, A.V. and R. E. DeWreede. 2002. Host specificity of the endophytic sporophyte phase of *Acrosiphonia* (Chlorophyta) in southern British Columbia, Canada. *Phycologia*. 41: 169-177.
- Sussmann, A.V. and R. E. DeWreede. 2001. Life history of *Acrosiphonia* (Chlorophyta) in southwestern British Columbia, Canada. *Amer. J. Bot.* 88: 1535-1544.
- Sussmann, A.V. and R.E. DeWreede. 2001. Seasonality of the red algal crust 'Petrocelis franciscana' (Rhodophyta) on boulder-strewn shores of southern British Columbia, Canada. *Phycol. Res.* 49: 51-59.

- Sussmann, A.V., B.K. Mable, R.E. DeWreede and M.L. Berbee. 1999. Identification of green algal endophytes as the alternate phase of *Acrosiphonia* (Chlorophyta) using ITS1 and ITS2 ribosomal DNA sequence data. *J. Phycol.* 35: 607-614.

D. PATRICIA THOMAS

UNIVERSITY EDUCATION

- Biochemistry Classes 1987 (Spring) Simon Fraser University, Biochemistry 301 and Biochemistry 302 were audited.
- M.A. 1980-1986 Simon Fraser University, Faculty of Education.
Area of concentration: Curriculum Development and Environmental Education
Thesis: "Editorial Critique of 'Sunship Earth' Curricular Materials"
- Professional Teacher Certificate 1975-1976 Simon Fraser University, Faculty of Education, Professional Development Program.
- M.Sc. 1971-1974 University of British Columbia, Faculty of Science, Department of Biology.
Area of concentration: Cell Biology and Immunology
Thesis: "A Comparative Study, Using the Light and Electron Microscope of Tissue Allograft Rejection in W-mutant Mice and their Non-mutant Littermates"
- B.Sc. 1967-1971 University of British Columbia, Faculty of Science, Department of Biology.

TEACHING EXPERIENCE

- 1987 - 2009** **Biology Instructor at Kwantlen Polytechnic University.**
Instructor for the following courses: Biology 1110, Biology 1210, Biology 2321, Biology 1160 and Biology 1260 ,Biology 2421
- 1982** **Sessional Instructor at Simon Fraser University, Burnaby, B.C.**
Instructor for Education 476 (Methods for Secondary Science Teaching)
- 1983** **Instructor at Institute of Technology, Burnaby, B.C. (Continuing Education)**
Instructor for Biology 12
- 1983** **Lab Instructor for Open Learning Institute, Richmond, B.C.**
- 1984**
- 1976 – 1981** **Secondary teacher at Okanagan Mission Secondary School, Kelowna, B.C.**
- 1978 – 1982** **Team Instructor at Simon Fraser University, Burnaby, B.C. in Education**
(Environmental Education)
- 1974 – 1975** **Lecturer at University of British Columbia, Vancouver, B.C.**
Lecturer for Biology 330 (Cell Physiology)

ADDITIONAL RELATED EXPERIENCES

- July 2000** **Lab research in molecular biology focusing on isolation of a specific gene.**
University of British Columbia, Vancouver, B.C.

- August 1987** Curriculum Development Contract for implementation of the **Biology Modules for the new Part-time Nursing Diploma Program** at Kwantlen College, Surrey, B.C.
- 1986 – 1987** Curriculum Development Contract for development of **audiovisual materials on a local ecological system** at Kwantlen College, Surrey, B.C. (Paid for by a Canadian Studies Federal Grant).
- May 1985** Curriculum Development Contract to aid in curricular revisions for the **Biology 1110 and Biology 1210 courses** at Kwantlen College, Surrey, B.C.
- 1980 – 1981** Development of a **Human Biology 11** course for School District 23

DOUGLAS JAMES TORRANCE

DEGREES HELD

M.Sc. (Biology) University of Calgary 1984 Specialization in Behavioural Ecology
B.Sc. (Zoology) University of Alberta 1979

TEACHING EXPERIENCE

Aug 2000 – present Instructor Kwantlen Polytechnic University
Sep 1998 – Aug 1999 Contract Faculty Douglas College

Jan 1996 – Aug 2000 Sessional Lecturer University of British Columbia
Sep 1994 – Apr 1996;

Jan 1998 – Apr 1998 Contract Instructor Kwantlen University College

Jan 1995 – Aug 1995 Laboratory Demonstrator Langara College

Jul 1994 – Aug 1994 Sessional Lecturer University of British Columbia

Sep 1991 – Apr 1994 Sessional Instructor College of New Caledonia

Jul & Aug, 1990 – 1993 Sessional Instructor Columbia College

Sep 1984 – Apr 1990 Laboratory Demonstrator University of Manitoba

Recipient of the Josephine Rauch Memorial Teaching Award, for outstanding teaching by a graduate student in the Zoology Department (1990)

Sep 1980 – Apr 1984 Graduate Assistant (Teaching) University of Calgary

Carl L. Whitney

EDUCATION

- 1979 Ph.D. University of British Columbia (Animal Behaviour and Ecology)
1973 M.Sc. University of British Columbia (Animal Behaviour and Ecology)
1970 B.Sc. Iowa State University (Major: Fisheries and Wildlife Biology; Minor: Botany)

POSITIONS HELD

- 1994 – Present Instructor of Biology, Kwantlen College/Kwantlen University College/Kwantlen Polytechnic University, Surrey, British Columbia, Canada
1992 – 1994 Associate Professor of Biology, College of Charleston, Charleston, South Carolina, U.S.A.
1986 – 1991 Assistant Professor of Biology, College of Charleston, Charleston, South Carolina, U.S.A.
1984 Lecturer, Capilano College, North Vancouver, British Columbia, Canada
1983 – 1986 Lecturer, University of British Columbia, Vancouver, British Columbia, Canada
1980 – 1983 Postdoctoral fellow, Rockefeller University Field Research Center, Millbrook, New York, U.S.A.

PUBLICATIONS

Whitney, C. L. and J. R. Krebs. 1975. Mate selection in Pacific tree frogs, Hyla regilla. Nature (London) 255:325-326.

Whitney, C. L. and J. R. Krebs. 1975. Spacing and calling in Pacific tree frogs, Hyla regilla. Can. J. Zool. 53:1519-1527.

Whitney, C. L. 1980. The role of the "encounter" call in spacing of Pacific tree frogs, Hyla regilla. Can. J. Zool. 58:75-78.

Whitney, C. L. 1981. The monophasic call of Hyla regilla (Anura: Hylidae). Copeia 1981:230-233.

Whitney, C. L. 1981. Patterns of singing in the varied thrush: the similarity of songs within individual repertoires. Z. Tierpsychol. 57:131-140.

Whitney, C. L. 1981. Patterns of singing in the varied thrush: a model of control. Z. Tierpsychol. 57:141-162.

Whitney, C. L. and J. Miller. 1983. Song matching in the wood thrush (Hylocichla mustelina): a function of song dissimilarity. Anim. Behav. 31:457-461.

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SHERRY M. WILSON

EDUCATION

1993	Ph.D. Molecular Biology (Plants)	University of Calgary
1987	M.Sc. Plant Hormone Physiology	University of Calgary
1982	B.Sc. Forestry	University of Alberta

EMPLOYMENT EXPERIENCE

<u>Dates</u>	<u>Title</u>	<u>Employer</u>
Sep 2003 to present	Biology Instructor	Kwantlen Polytechnic University Surrey, BC
Aug 2002 to Apr 2003	Sessional Biology Instructor	University College of the Cariboo Kamloops, BC
Aug 1999 to Jul 2002	Biology Instructor	Selkirk College Castlegar, BC
1997 – 1999	Industry Services Project Coordinator	Renewable Resources, BCIT Burnaby, BC
1996 – 1997	NSERC Post-doctoral fellow	Agriculture and Agri-Food Canada Summerland, BC
1995	Advisor to CIDA	Eastern Indonesia University Development Program Simon Fraser University
1994 – 1995	Sessional Biology Professor	University of Northern British Columbia (UNBC), Prince George, BC
1985 – 1993	Graduate Teaching and Research Assistant	Calgary, AB

SIGNIFICANT ACCOMPLISHMENTS

1994	Wilson, S. M. and T. A. Thorpe	Co-wrote a review Chapter in Somatic embryogenesis in woody plants.
1990	Wilson, S. M.	Presentation to Conifer Biotechnology Working Group, Kent, England.
1990	Wilson, S. M.	Presentation to Canadian Society of Plant Physiologists, Calgary, AB.
1989	Wilson, S. M.; Thorpe, T. A. and M. M. Moloney	Peer reviewed paper in Plant Cell Reports 7: 704-707
1989	Wilson, S. M.	Poster at Genetics Society of Canada and Canadian Society of Plant Molecular Biologists. Calgary, AB.
1986	Dymock, I. M. and S. M. Wilson	Publication in Proceedings of the 1984 Prairie Federal-Provincial Nurserymen's Meeting,

APPENDIX C Letters of Support



A POLYTECHNIC INSTITUTION

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

Attention: Jane Hobson, Kwantlen Polytechnic University

Re: Kwantlen Polytechnic University Degree proposal for BSc. in Biology, Review

The program goals of the proposed Bachelor of Science in Biology program at Kwantlen University including both providing a foundational BSc degree grounded in scientific methodology and practical skills as well as to provide graduates with competency, skills and experience necessary for fields in health. These program goals align well with the Cardiac Sciences distance delivery programs at BCIT.

The on-line and mixed-mode delivery methods proposed, is the current model of delivery within the Cardiac Sciences programs. This gives graduates from the proposed program a good foundation and preparation for the method of delivery common in both Cardiology Technology Diploma and Cardiovascular Perfusion Advanced Certificate.

The admission requirements for the proposed BSc degree in Biology would cover off all entrance requirements required for the Cardiology Technology Diploma program. Additionally, the A&P electives would adequately prepare and potentially serve as transfer credit for BHSC 1119 in the diploma program. The combination of the Biometrics and research courses would adequately prepare and potentially serve as transfer credit for CARD 1186, Statistics for Cardiology. Additional consult with the both the Basic Health department and Math department would be required to confirm.

The Kwantlen BSc degree completion would serve to cover off the major entrance requirement for the Cardiovascular Perfusion program. Other specific courses including Cell Biology, Organic Chemistry and the Research project course would satisfy course specific requirements for entrance into this program. See website for details. Cardiovascular Perfusion is a post degree program with specific content related to the field and therefore transfer credit from another program is unlikely.

The option "to expand, developing other more specialized science degree options and program initiatives in coming years" would serve as an excellent foundation for the Cardiac Sciences Cardiovascular Perfusion post degree program, particularly in the areas of Chemistry and Physics. These are areas in which students will require strong foundational knowledge to be successful.

Additionally, should the program offer the students strong foundational practical aspects of modern biological science in addition to the theoretical components, this will be of great benefit. This would prepare potential students for entry into graduate studies programs in the Cardiac Sciences department at BCIT where the practical skills required for 'entry to practice' into perspective fields are critical.

The ability for the students to actively engage in research and to gain practical work experience through a Co-op program in this proposed degree program would serve graduates well interested in both the Cardiology and Cardiovascular Perfusion programs in their studies and practical component.

Respectfully,

A handwritten signature in black ink, appearing to read "Cindy Mazerolle", is written over the typed name.

Cindy Mazerolle

Program Head, Cardiac Sciences, BCIT



11 August 2010

Dear Dr. Carr,

I am very pleased to be able to offer feedback on the proposal put forth by Kwantlen Polytechnic University to offer a Bachelor's of Science degree in Biology. It is my conclusion that this is a very solid proposal that will create a program benefiting many students and enhance the science education in the province of British Columbia.

The proposed curriculum, while not as varied as other more established Universities, does provide a broad foundation of knowledge in Biology and is certainly sufficient in related fields of Physics, Chemistry, and Mathematics. In cases where the students would like to develop their knowledge in a particular area and where courses are not available, a directed studies or co-op placement will be offered through Kwantlen. Additionally, the laboratory experience the students at Kwantlen will obtain is on par with, if not better than, other BC Universities. The development of these concrete lab skills is critical for preparing the students to continue into graduate degree training or other fields of study. That said, course-based lab training may be insufficient for developing the hands on experience that is needed for direct entry into the workforce. As a consequence, I would recommend that all students aiming to enter the job market after their BSc – whether from Kwantlen or from other institutes – seek additional laboratory training through a co-op work term. I would also hope that these students would have the full support of their Program in pursuing such co-op placements, including help with finding jobs and careful monitoring of student progress.

In sum, I offer my full support to the implementation of a BSc in Biology program at Kwantlen Polytechnic University. It will be a pleasure to follow the performance of graduates from this expanded training opportunity.

Sincerely,

Dr. Cathie Garnis, PhD
Assistant Professor
Faculty of Medicine (Department of Surgery)
University of British Columbia
Senior Scientist
Department of Integrative Oncology (Genetics Unit)
BC Cancer Research Centre

THE UNIVERSITY OF BRITISH COLUMBIA



Faculty of Science
6270 University Boulevard
Vancouver, BC Canada V6T 1Z4

Tel: (604) 822-3659
Fax: (604) 822-5558

Office of the Dean

August 16, 2010

Dr. Brian Carr
Dean of Science and Horticulture, and Institute for Sustainable Horticulture
Kwantlen Polytechnic University

Re. Proposed B.Sc. in Biology

Dear Brian:

I have reviewed the "Program Concept" document in which you set out the rationale for a new degree, a B.Sc. in Biology. I offer my support for most aspects of the proposal. Studies in biology attract many undergraduates and at UBC we are unable to accommodate all students who seek space in our Major or Honours options in that subject and we acknowledge that we need to increase the number of spaces. We will be reducing the unmet demand but we anticipate that we will not be able to reduce it to zero so there is still room for you to develop a major, which will further your institution's goals. I have four specific comments:

- At UBC, an on-going review of curriculum goals and structure has led to major changes in our offering, which are being implemented over the next few years. Once change is the infusion of significant new resources to support new laboratory and field experiences for more students. At Kwantlen Polytechnic University, you propose to continue the tradition of providing students with laboratory experience in many disciplines, and you acknowledge the costs, but I suggest that you might consider whether laboratory components are needed in all courses or whether some stand-alone laboratories might be designed to provide the required technical experiences that unite some of the disciplines (see later comments on physiology as an example).
- A second change at UBC is the elimination of the multitude of specializations within biology for all but Honours candidates, leaving a "Major in Biology" as the main degree path. In some ways, that change mirrors the proposed design of your B.Sc. in Biology, with core courses up to and including part of the third-year curriculum, leaving the choice of electives to the student. Of course, as a smaller institution, Kwantlen Polytechnic University will be able to offer a smaller range of biology electives, but, if you get the core "right", your graduates will enjoy a solid, broad educational background. Responding to the need for broadly educated graduates, as articulated by employers, may be a further way to justify your proposal (whereas trying to get students prepared for specialized advanced study or employment opportunities may prove difficult).
- In terms of the "core", I note that you include animal physiology but not plant or cell physiology. There are many principles that unite the study of physiology across those sometimes artificial boundaries and you might consider looking at "physiology" as the core rather than, for example, highlighting "animal physiology" and then trying to

August 12, 2010

Dr. Brian G Carr
Dean of Sciences
Faculty of Science and Horticulture
Kwantlen Polytechnic University

RE: Bachelor of Science Degree

I am a first-year student in the Associate of Science in Biology degree program and I am writing to express my interest in completing a Bachelor of Science in Biology degree at Kwantlen. I have found it very frustrating to have to plan out my degree according to the lower level requirements of other institutions, particularly since I feel that Kwantlen is capable of offering better degree options than UBC or SFU.

I initially chose to attend Kwantlen because of the promise of small class sizes and dedicated instructors. Having been a student here for the last two semesters I have realized that not only has Kwantlen delivered on that promise, but that this would be the perfect environment in which to complete a baccalaureate degree. Other universities maintain such large class sizes that students would be lucky if teachers even recognize them. Being forced to transfer to a university in which instructors are too busy to care about their students is not something I or many of my friends look forward to.

As biological research is my area of interest and also something I feel is important in every area of biology, I hope that a Bachelor of Science degree with a focus on research will soon become available at Kwantlen. Co-operative education opportunities would undoubtedly also be beneficial by enabling students to fully prepare for careers in biology.

It is my belief that Kwantlen is uniquely positioned to offer students better quality Bachelor of Science degree programs than other universities. I look forward to being able to complete a Bachelor of Science degree at Kwantlen.

Sincerely,

Miriam Derksen

Miriam Derksen
Student # 100239511