Program Review

Final Report

Biology and Chemistry

Faculty of Arts, Science and Management
North Island College
May 2023

Submitted to

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Faculty of Arts, Science and Management

North Island College
2300 Ryan Road
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Preamble

As we continue working through the process of program review and renewal we are guided by the college's overarching, interwoven strategic plans, ***BUILD 2026, Widening Our Doorways, Working Together – the NIC Indigenization Plan*** and the ***Community Engagement Strategy.*** The recommendations put forth (and the action items detailed in the accompanying Action Plan) align with commitments articulated in the guiding documents and are part of our continued effort to meet the needs of our diverse community of learners.

A. Executive Summary

The Biology and Chemistry Program area wrote a self-study (Section D and E) and shared with three reviewers who formed the external review team. The reviewers met virtually with faculty for one-hour, and with various people at North Island College for two days to explore and learn more about the challenges and successes of the Biology and Chemistry Program area.

The reviewers provided twelve recommendations related to commitment to learners, program structures, the learning community, practices, and collective impact (Section F). These included recommendations regarding curriculum development, program goals, student engagement, Indigenization, and internationalization.

The Biology and Chemistry Program area has written this final report summarizing their self-study recommendations, along with their response to recommendations from the external review team (Section G).

This report accompanies an Action Plan report which details action items to undertake the recommendations as well as address other strategies within NIC's guiding plans.

B. Background

External review is an integral component of NIC's program review process and follows the completion of the internal self-study report. The external review is conducted by a team of three members, two of whom are external to NIC, and one who is an NIC faculty member from another department. The purpose of the external review is to validate the internal self-study report, conduct a virtual or on-site visit, and provide any additional information regarding program strengths and opportunities for improvement.

The self-study was first completed in May 26/28, 2021. Survey data from current students, alumni, and faculty were included to support the conclusions and recommendations shared in the self-study. The Self-Study was edited by Centre for Teaching, Learning and Innovation staff and presented to the external reviewers.

On March 17 and 18, 2022 the external review team convened to review the biology and chemistry program areas and meet with various program stakeholders. The External Review Report was finalized in May 2022. The external review team consisted of:

- Dr. Morgan Martin, Instructor, Biology, Okanagan College
- Todd Stuckless, Instructor, Chemistry, Langara College
- Murray Erickson, Chair, Tourism & Hospitality Managment and Instructor, Business Administration, NIC

The external review team focused their review and discussion on the following:

- Whether the self-study report addresses the key quality indicators as outlined in self-study guide
- Whether the recommendations in the self-study report are supported by the findings in the self-study report
- Whether the findings in the self-study report are validated by the external review team visit and meetings with stakeholders
- Other ideas, observations, or recommendations for enhancing the student learning experience and overall program area development and growth

The external review team, in fulfillment of its responsibilities met with:

- Vice-President, Academic: Tony Bellavia
- Dean, Arts, Science & Technology, Business and Applied Studies: Neil Cruickshank
- Department Chair: Alexandra Blair
- Associate Registrar: Darrin Bellham
- Director, Institutional Research and Planning: Wes Skulmoski
- Evaluations/Student Records: Diana Fearn
- Student Recruitment and Advising: Danielle Hoogland
- Executive Director, International Education: Mark Herringer
- Manager, International Enrolment and Recruitment: Junko Leclair
- Director, Centre for Teaching and Learning Innovation: Liesel Knaack
- Executive Director, Indigenous Education: Kelly Shopland
- Faculty
- Four Students

Faculty wrote this Final Report in September and October, 2022, finalizing it on Oct. 14, 2022. That Final Report from Oct. 2022 consisted of:

- Sections C-E that are composed of the same information as in the Self-Study.
- Section F summarizes the External Review Report
- Section G responds to the twelve recommendations of the External Review Report
- Section H was the Summary.

In May 2023, Faculty were asked to update this Final Report, using an updated template, and to add Section H on Indigenization of Teaching and Learning Experiences. The updated Final Report and Action Plan were finalized May 31, 2023 and sent to the Dean for review.

C. Program Characteristics

Two credentials exist for students focusing on the sciences: an Associate of Science (AS) degree and the Island Pre-Health Advanced Diploma.

Requirements of the Island Pre-Health Advanced Diploma include:

There is a specific set of courses to be completed for this program, providing students with a total of 104 credits. If taken as a full-time program, 68 credits are completed in the first two years and 36 credits in the third year. Electives are only in the third year of the program, with a choice each semester. Courses included in this program are from multiple departments and discipline areas: Biology, Chemistry, Math, Physics, English, Psychology, Aboriginal Leadership, Philosophy and Nursing.

Upon completion of all course requirements with an overall average grade of C (cumulative GPA of 2.0) students will be awarded an Associate of Science Degree in Island Pre-Health and an Advanced Diploma in Island Pre-Health.

Requirements of the Associate of Science degree:

General Requirements
60 semester credits of first- and second-year courses. These must include a minimum of 18 credits in science at the second-year level taken in two or more subject areas.

Specific Requirements
6 credits in first year English
6 credits in mathematics which shall include at least 3 credits in calculus
36 credits in science, which shall include at least 3 credits in a laboratory science
6 credits in arts other than English (excluding mathematics and laboratory-based science courses)
6 credits in arts, science, or other areas.

Names of Courses Offered within the Biology and Chemistry Program Areas

BIOLOGY

BIO - 060 Concepts in Biology I (Inhabiting the Human Body) (with lab)
BIO - 102 Principles of Modern Biology II (with lab)
BIO - 103 Principles of Modern Biology 1 (with lab)
BIO - 110 Concepts of Biology I (Inhabiting the Human Body) (with lab)
BIO - 111 Concepts in Biology II (Inhabiting the Earth) (with lab)
BIO - 113 Introduction to the Marine Environment
BIO - 160 Human Anatomy & Physiology I (with lab)
BIO - 161 Human Anatomy & Physiology II (with lab)
BIO - 170 Foundations of Ethnobotany
BIO - 200 Cell Biology (with lab)
BIO - 201 Introduction to Biochemistry
BIO - 203 Principles of Genetics (with lab)
BIO - 211 Invertebrate Biology (with lab)
BIO - 215 Introductory Microbiology (with lab)
BIO - 230 Principles of Ecology (with lab)
BIO - 250 Directed Independent Studies in Biology
BIO - 260 Pathobiology I (not currently offered - Nursing developed their own)
BIO - 261 Pathobiology II (not currently offered - Nursing developed their own)

CHEMISTRY

CHE - 051 College Preparatory Chemistry I
CHE - 060 College Preparatory Chemistry II
CHE - 110 Chemical Principles I
CHE - 111 Chemical Principles II
CHE - 152 Engineering Chemistry
CHE - 200 Organic Chemistry I
CHE - 201 Organic Chemistry II

D. Summary of Strengths and Challenges

Strengths

Students in the sciences at NIC report a high level of satisfaction with the quality of their education[1] . Reasons for the high satisfaction include small, in-person class and instructor committment to high quality education. Small, in-person classes allow faculty to build relationships with students, to conduct class with high student participation, to provide signficant skill development during laboratory activities and field trips.

Faculty are strongly invested in student success. Many faculty members actively participate in professional development sessions to ensure currency in pedagogy, in their field of expertise, as well as in other topics that they teach. Through innovation, collaboration, and the continued use of NIC's Centre for Teaching and Learning Innovation, faculty continually revise teaching methods to implement tested strategies in adult learning. Use of departmental student evaluation tools allows faculty to gauge student satisfaction and pinpoint specific areas for improvement. Good collegial relationships exist that support and nurture good teaching.

Faculty are closely connected to local communities, bringing into the classroom examples of scientists working in the community, and application of classroom concepts to the local community. These connections foster opportunities to engage students in NIC student research, volunteer opportunities in local non-profits and industry, which lead to student employment and career development.

General Challenges

Lack of Face-to-face delivery on all campuses:
Factors negatively impacting the program areas' ability to meet learner commitments center on the reduced ability to build relationships by connecting face-to-face with students. Compared to pre-Covid face-to-face courses offered, Campbell River and Port Alberni both lost F2F delivery for Bio 102/103, Bio 160/161, Bio 060/110 Chem 110/111 for the 21/22, 22/23 academic years. The loss of F2F delivery negatively impacts enrolment, retention and student success in both first and second year.

In addition to the loss of F2F delivery, the online delivery of Bio 060/110 and Che 110/110 in the 2022/23 academic year was asynchronous, meaning students had no regular in-person contact with the instructor. This resulted in low enrolment and low student success. These courses support enrolment in first- and second—year courses, respectively, and loss of those "feeder" students will have impacts for at least the next two years.

Attrition between first and second year: limited lab space in the Comox Valley, and course delivery methods
Approximately 25% of first year students remain on campus to complete second year courses. Based on student surveys, students leave to be in a more immersive post-secondary experience, and to have more diverse second year course options. Students in Campbell River and Port Alberni would have to move to the Comox Valley or have a long commute, and then move again for third year, so choose to make the move after first year. These factors are beyond our control. Second year enrolment could be bolstered by increasing first year enrolment, but that increase is limited by lack of lab space in the Comox Valley, which limits the number of lecture sections that can be delivered. Limited lab space means no more lab courses or sections can be offered.

[1] https://www2.gov.bc.ca/gov/content/data/statistics/people-population-community/education-training/bc-student-outcomes

The Campbell River campus has more classroom and lab capacity but travel from the Comox Valley campus to the Campbell River campus is challenging, with buses available only twice per day, making private transport almost essential. An intercampus shuttle for staff and students could alleviate this problem.

Reduction in term length
The reduction of one instructional week as of the fall of 2021 has put a strain on instructors trying to ensure content and objectives are met for purposes of articulating to many different receiving institutions. Consequently, this means students inevitably are required to review more material on their own, rather than in class time. Student evaluations reflect the time-crunch they experience to learn the material in a shorter period of time.

Course and Program Development
Past efforts to develop new courses and programs have not resulted in their long-term establishment, or they have been delivered for only a few years. Therefore, faculty may be reluctant to do work that history demonstrates may be in vain. Examples include Ethnobotany, delivered for only one year, and the Exercise and Wellness Program delivered for only two years. New courses and programs are also limited by the lack of lab space on the Comox Valley campus, as explained above.

Recruitment Challenges
Loss of the Open House event on the Comox Valley campuses means loss of an important first point of contact between students and topic specific instructors.

Other Funding Associated Challenges

BIO 250 - Directed Studies has no compensation associated with it; i.e., students pay tuition, but instructors do not get paid to supervise the student. While it is a valuable opportunity for students to engage in self-directed research, lack of compensation to faculty restricts enthusiasm, and recruitment to the course.

E. Self-Study Recommendations

The following recommendations come from the self-study completed by faculty in Fall 2021 and updated in May 2023.

Commitment to Learners

Focus: This area focuses on the program's commitment to student learning by reflecting on the underlying values and philosophy of the program. This includes the alignment of program commitments with the needs and expectations of students, the institution and the broader discipline, industry, or profession.

Recommendations:

1. Engage faculty members in developing a relevant set of program learning outcomes to build a vision and direction for the department and its credentials.

2. Align course content to core competencies from professional associations to determine where content can be reduced while ensuring transferability and learning of the core competencies.

Program Structures

Focus: This area focuses on the roots and design of the program, as well as how and why the program has evolved over time highlighting key milestones, developments, and accomplishments as it relates to the student learning experience. This includes the evolution itself, as well as the mechanisms in place for identifying and responding to emerging needs and changing realities.

Recommendations

3. Update Learning Outcomes for all courses.

4. Create new program streaming that develops cohorts or groups of students collectively working towards the same goal. Suggestions include:

    - **The Island Pre-health Advanced Diploma** was developed during the past two years of this program review. The first cohort will start in September 2023, and fulfills some recommendations of the self-study and external review. The Island Pre-Health Sciences program leads to ability to apply directly to professional programs (e.g., dentistry, medicine, pharmacy, chiropractor, optometry), and block transfer into other universities to complete a B.Sc. or B.HSc.; awarded with Associate of Science Degree & Advanced Diploma at the end of 3 years at NIC. Program Link
    - **Foundations of Science Certificate** One year certificate for first year science: Bio 102/103, Chem 110/110, Math 2-terms, Physics (2-terms), English, one other elective.
    - **Associate of Science degree in Environmental Science** This is a popular program at other institutions and could be developed using existing courses. It could be a pathway to four-year programs at UVIC, Royal Roads University, SFU, and Vancouver Community College (VCC). Douglas College has a 2-year program that NIC could mimic, with similar math, English, and science courses (https://www.douglascollege.ca/program/asensc)
    - **Marine Biology Diploma** - leads to UVic's Marine Biology concentration
      To align with the first two years of a biology degree at UVic, with key interest courses: BIO 113 - Introduction to Marine Environment (elective) & BIO 211 - Invertebrate Biology (goes to UVic BIO 321 - Survey of Invertebrates). This program would package existing courses into a new diploma, specifically: First year: BIO 102/103, CHEM 110/111, MAT 102/151, PHY 100/101; second year:

BIO 200, 201, 203, & 230, (new biochemistry course), CHEM 200/201, STA 115. Two electives in the first year (NIC BIO 113 & English), two electives in the second year (choice + BIO 211 - part of UVic's Year 3 concentration in marine biology) and one additional science course (e.g., BIO 215 or 250)

- Create a "**Biologist in Training**" stream through CAB/APBBC (20 credits in biology). This may also lead to institutional transfers, including BCIT or various other universities, with the possibility of also leading to trades program areas in forestry or environmental technicians.
- **Island Studies** (i.e., Tideline to Treeline: the natural and cultural history of northern Vancouver Island) – non-majors bio, marine science bio, ethnobotany, ecology, invertebrate biology, courses within HHMS (i.e., anthropology, sociology), leads to tourism careers; potential package with trades tourism, or Coastal guardian program area – Associate of Arts & Science Degree with possible transfer to other institutions.
    - Similar to PEI's cross disciplinary Island Studies (http://islandstudies.com/mais-program/#islandstudiesminor)
    - Possible course options:

      ANT - 150 Cultural Anthropology; FNS - 096 BC First Peoples Studies; ABG - 100 Histories and Impact of Colonization; BIO - 113 Introduction to the Marine Environment ; BIO - 230 Principles of Ecology; BIO - 211 Invertebrate Biology ; CFW - 101 Indigenous Lands and Culture; RFT - 104 Plant Identification and Classification ; HIS - 225 History of British Columbia; GEO - 200 Geography of Canada ; GEO - 111 Environment, Society and Sustainability; GEO - Intro to Climate Change: Human and Ecological Dimensions
      TGA - 101 Interpretation Culture

5. Create a **botany stream** within the biology program area connecting to forestry, agriculture, horticulture, and environmental sciences. This stream could include a botany course, ethnobotany course, soil biology course, and resource management course – all of which could be part of an environmental studies program area with lots of hands-on field training.
    a. This would include majors-biology instead of teaching Botany 101, and could also include a rewritten ethnobotany course, and an ecology course. Faculty have also suggested a 2nd year course on aquatic and terrestrial botany.
    b. In the past, botanical courses were developed as part of the Renewable Resources Technology program area (Trades), currently forestry courses in the trades program area could become part of this stream.

6. Create **chemistry courses:**
    - Reinstate Che 103/104, chemistry lab course for **non-science students,** with no chemistry pre-requisites. Potential focus topics could be **"Food and Cooking Chemistry**" course will allow students to develop an understanding of what happens when food is cooked. The lab portion will have students perform experiments to better understand cooking practices and compare materials used to make modern cooking utensils. There is a possibility of coordinating labs with the Culinary Arts program or the Craft Brewing program at NIC. Other target students include Education and Dental Hygiene.
    - Add **second year chemistry** so students on a chemistry path stay at NIC for second year.
        - Second year analytical chemistry (transfers to UVIC 212, VIU 213, UBC 211, SFU 215/6)
        - Comprehensive lab (transfers UVIC 260, VIU 260, UBC 245)
    - Add **Environmental chemistry** (second year for an Environmental Science diploma – would need to be part of a block transfer agreement)
    - **Directed studies in chemistry**
      This course would provide students with an opportunity to carry out independent study and research under the supervision of a departmental faculty member, like existing Bio 250. The course would be designed for students who have completed 1st year chemistry. In addition to

guided learning in a number of areas in chemistry (analytical, organic, thermodynamics, electrochemistry, inorganic, organometallic), the student will devise and perform experiments related to the selected areas.

7. Acquire an NMR spectrometer for organic chemistry to meet existing quality of lab skill development at other institutions.

Learning Community

Focus: This area focuses on the program as a learning community. This includes interactions and relationships between and among faculty and students within the program, as well as engagement with broader communities (e.g., institutional, regional, discipline, industry, or profession specific relationships).

Recommendations

8. Continue to recruit and involve students in community research (e.g. forage fish and kelp projects)

9. Continue to collaborate with community organizations to share opportunities and learning with students (e.g. Clayoquot Biosphere Reserve and Bio 211 students, Bio 230 students volunteer with a community organization as part of assessment, Bio 102 learning about environmental organizations' work on streams).

10. Continue faculty engagement with multiple professional associations, community boards and organizations (e.g. lead roles in Articulation committees, presentations for Elder College, Beaver Lodge, Cycling Advocacy, Project Watershed, Forage Fish)

11. Build a sense of program area belonging and create a cohesive, connected community of biology and chemistry students. Activities to build this community could include:
    Faculty-led "lunch and learns" that share a science paper once every 1-2 weeks, and develop an online 20-minute journal club with Q&A. These initiatives would be introduced at all campuses to allow:
    Faculty to learn more about each other's areas of interest.
    Students to feel part of a program area and get excited about future careers.
    For both faculty and students to learn about new and innovative aspects of science (i.e., new techniques, new ideas, new applications of basic concepts). Faculty can find areas of overlap between fields and show connectedness of basic concepts.
    For student exposure to new ideas and research, fostering increased understanding, this could also include traditional science from indigenous knowledge keepers.

12. Develop a 'Science at NIC' Orientation Module for students to learn about academic streams, courses, and careers available in biology or chemistry, possibly built in to course shells, and could include:
    a. Orientation Welcome Session – meet and greet opportunity
    b. "Meet the faculty member" videos
    c. Short course bio videos, describing the highlights of your courses
    d. Setup 'meet-and-greet' mentorship program area with individual students and faculty
    e. Engage with students for future planning (second year, transfer institutions, jobs and mentorship)

13. Develop a Sustainability Club, open to all NIC students, focused on volunteer opportunities for students to learn about local ecosystems and environmental issues, and would include informal field trips to local ecosystems and guest speakers.

14. Create a new student award for those in 2nd year having completed at least six courses.

15. Create opportunities for 1st and 2nd year students to interact (i.e., 2nd year students could help with some 1st year labs).

Practices

Focus: This area focuses on teaching and learning practices, including assessment and evaluation methods and the alignment of these approaches to supportive practices. This includes the methods or approaches members of the department engage in to fulfil the stated commitments while engaging in reflective practice.

16. Revise courses to incorporate more inclusive and student-led pedagogical designs as part of all courses; e.g. team-based learning, active student practice in F2F delivery, student engagement in asynchronous delivery.

17. Build a lab-prep module that every student in a science course would do in the first week of classes, allowing:
    - Better program area organization where, for example, students wouldn't need to repeat the lab safety test for every course.
    - Clear communication outlining lab skills that students will develop in various courses, helping to inform students about courses they are not currently taking – resulting in better course retention.
    - Shared information specific to employment and the connection between careers and lab skills (i.e., showing examples of people in the community working in related careers).
    - Support for students getting to know each other by providing activities they can do on Day 1 of lab to familiarize themselves with their lab partner, and by providing opportunities to deal with challenges common to working together in a lab.
    - Explanation statements about the oral communication skills students will gain in a lab.
    - Assessment – including reflection on their experience in the first lab.
    - Support for good mental health by providing strategies to deal with potential anxiety-creating situations.
    - Support for Indigenous ways of being by developing relationships and reflecting on practice.

18. Examine department practices to assess opportunities for low-waste, reduced energy use, and other environmentally sustainable practices. Carry out events following these principles.

Collective Impact

Focus: This area focuses on the accomplishments and contributions of faculty and students from the program. This includes learning experiences, opportunities and outcomes related to the program. This also includes mechanisms in place to help faculty and students reflect upon and recognize accomplishments.

Recommendations

19. Continue to recognize students in our Department Awards Tea, given every Spring.

20. Host a half-day event for the department members (faculty and students) to share highlights of student work and teaching practices.

21. As part of the third year of Island Pre-Health Science, collaborate with BSN students to share research findings from their IPH 350 Applied Research course – create a Global Research Sharing session.

22. Implement ongoing and proposed activities to support reconciliation and Indigenization (see Section H).

F. Summary of Key Findings from the External Reviewers

Section A Commitment to Learners and Section B Program Structure

The external reviewers condensed these two topics. They said common themes in the self-study and interviews include:

- The faculty in Biology and Chemistry are dedicated and greatly committed to their learners, and are continuously working to develop their teaching strategies.
- Small class sizes and accessible instructors is a differentiating factor for NIC.
- Second year courses are valuable for student retention and the breadth of their educators' experience and professional currency.
- Biology and chemistry have been at the forefront of innovation in distance learning, being first in online labs and Hyflex delivery.

Recommendations of the External Reviewers:

1. Maintain face-to-face lectures on all campuses: "While ensuring face-to-face options are maintained for students on campus, one or more sections of multi-section courses could be offered online or in a Hyflex model."
2. Create a two-year diploma and a 1-year certificate.
3. Develop new courses
4. Reflect on the necessity of course labs, prerequisites, and relative difficulty of their courses
5. Expand dual credit offerings with local high schools
6. Publish a 2-year schedule of courses.
7. Consider expanding fall and winter offerings/enrolments first before inter-session and summer courses.
8. Provide unstructured space for students to gather and work on their own time would be more valuable.
9. NIC administration and faculty needs to find some unbiased way to solicit feedback from its students.
10. We recommend regular and clear communication between Advising and the faculty members of the program. Inviting Advising to attend at least one department meeting each year would improve communication and keep Advising grounded in current curriculum. "*Two of the four students surveyed suggested NIC advising was unhelpful to them and one of the four only used the website (which only refers students to the BC transfer guide).*"
11. Advising could prepare course planning documents that outline transfer. For example, "the NIC pathway to a BSc in biology from UVic." The document could list transferable courses the student could take at NIC and any courses they would need to take once transferred to be fully in third year."
12. The program would benefit from better coordinated planning for the use of course development and PD time to ensure both course and program updates and renewals

G. Program Response to External Reviewers' Recommendations

Commitment to Learners

Focus: This area focuses on the program's commitment to student learning by reflecting on the underlying values and philosophy of the program. This includes the alignment of program commitments with the needs and expectations of students, the institution, and the broader discipline, industry, or profession.

The external review had no recommendations in this section but raved about the quality of instruction and commitment to learners by faculty.

Program Structures

Focus: This area focuses on the roots and design of the program, as well as how, and why, the program has evolved over time highlighting key milestones, developments, and accomplishments as it relates to the student learning experience. This includes the evolution itself, as well as the mechanisms in place for identifying and responding to emerging needs and changing realities.

Recommendation # 1

Maintain face-to-face lectures on all campuses: "While ensuring face-to-face options are maintained for students on campus, one or more sections of multi-section courses could be offered online or in a Hyflex model." p6 of the External Review Report.

Response: We agree with this; F2F delivery has been replaced by online learning, with loss of F2F classes in Campbell River and Port Alberni, against the desires of faculty. Implementation of this recommendation from the External Reviewers requires adminstrative support to fund delivery with a pre-Covid model of equal access to face-to-face education for all communities. Online delivery can provide flexibility, but should not surplant face-face delivery.

Build 2026:	Doorways: 4.2 Increse the % of courses with multi-modal delivery
Indigenization Plan:	Building relationships support Principles of Indigenous Learning and requires F2F interaction.
Widening Our Doorways:	Doorways: Point #3 Multi-Modal, Flexible Enrolment; 3.2 3.4
Community Engagement Strategy:	Enhance accessibility and inclusivity on all campuses and learning centres.

Recommendation # 2

Create a two-year diploma and a 1-year certificate.

Response: We agree. A first step should be to create Program Learning Outcomes. Possible options for new diplomas, some of which require no new course development, are listed in Section E, Recommendation 2. A one-year certificate does not require any new courses.

Build 2026:	Doorways: 4.3 Pathways to Learning; # students participating in post-secondary

Rooms: 5.3 Self-directed and customized learning: Increase # of short-term customized microcredentials and programs

Indigenization Plan: None of the goals are directly applicable to this recommendation.

Widening Our Doorways: Doorways: Point #3: Multi-Modal, Flexible, Demand-Based Enrolment that Occurs Year-Round with a Focus on Building Self-Directed Skill-Based Learning & Customized Credentials

Recommendation # 3

Develop new courses: *"We recommend the program focus on expanding first year courses and transferability of courses before adding additional second year courses, other than those suggested below"*

Response: We agree. However, expanding any course, first or second year, requires more lab space on the Comox Valley campus so cannot be done until that essential renovation is complete. The following list includes changes that could be made with financial support:

- Second term of Microbiology, transferable to UVic MICR 200B and VIU MICR 211.
- Che 103/104 Non-science chemistry and "Food and Cooking Chemistry"
- Botany course that transfers to VIU as Biol 223 – supported by advising
- Analytical chemistry course

Build 2026: Doorway 4.1 Provide multiple access points

Doorway 5.5 NIC's courses and programs must continuously evolve to continue to be responsive to the changing needs of students, communities, businesses, and industries across the region.

Doorway 8.1 # of courses, research, and applied learning initiatives that include sustainability and climate

Indigenization Plan: This includes infusing Indigenous ways of knowing and being into course work and programs so that they are seamlessly recognized, acknowledged, and respectfully treated as equal to all other perspectives reflected in campus curriculum.

Continue to partner with Indigenous communities and Continuing Education to develop accredited decolonized post-secondary courses and programs that can be delivered in communities and on campus.

Widening Our Doorways: Enhance participation and related supports for program review and curriculum renewal processes to align with institutional directions and reporting requirements, accreditation, articulation, training and ongoing program and course development;

Increase % of courses with more than one entry point per year

Define the value and purpose of face-to-face and place-based learning for each program by developing courses and programs that speak to local communities.

Initiatives:

a. Develop courses, programs, research and applied learning opportunities that focus on sustainability

b. Expand the number of courses that include climate change in their curriculum

Recommendation # 4

We asked the faculty to reflect on the necessity of course labs, prerequisites, and relative difficulty of their courses.

Response: Most of this does not apply to our courses. Course content and labs are dictated by provincial articulation agreements. A lab cannot be removed from a lab course without loss of transferability. Prerequisites are based on strong evidence that students without the prerequisite courses have low success unless highly motivated. Bio 160/161, institutions who do not have prerequisites for their equivalent course have failure rates close to 50%. We do not support this action that sets students up for failure. One exception includes Bio 203 Genetics, which could have the Chem 110/111 prereq removed and that has been done.

Recommendation # 5

Expand dual credit offerings with local high schools

Response: We agree with this; we are limited by lab space on the CV campus. Recruitment work is required to ensure high school counsellors are aware of courses that could be offered. This was tried for Bio 102/103 with delivery late afternoon to allow high school students to take the course but there was no high school enrolment. This requires work with the high school schedule so students take the necessary prerequisites in the Fall term.

Build 2026: 4.1 Program Entry (support students with multiple access points i.e. pathways for dual credit for high school students)

4.2 Learning and Services (increase access to education and training by offering s students flexible learning and service options)

4.3 Pathways to Learning (connect students to learning opportunities close to home and across BC)

6.1 Brand and Identity (better defined overall role and scope of the College), Community Engagement Strategy

6.2 Integrated Enrolment (better coordinate and strengthen how we communicate the value of our programs to prospective students)

9.1 Serving the People of the Region (higher enrolment from withing the region)

Indigenization Plan: N/A

Widening Our Doorways: 2.2 Optimum enrolment at each location

3.5 % of BC high school students who transition to NIC within two years (review a and renew dual credit agreements with local school districts)

3.6 # students participating in post-secondary pathway agreements (develop new dual credit NIC partnership model)

Recommendation # 6

Publish a 2-year schedule of courses.

Response: We agree with this recommendation. The lead on this would be administration. This would provide more certainty to students in their educational planning and support second-year enrolment better.

Build 2026: 5.5 Program Response and Renewal (schedule courses in a 2-year framework to align with program renewal plans)

6.2 Integrated Enrolment (coordinate with advising regarding 2-year scheduling of courses)

7.4 Enrolment Planning (ensure NIC offers student spaces in the region)

Indigenization Plan: N/A

Widening Our Doorways: 2.2 Optimum enrolment at each location (through enrolment planning, set annual enrolment targets

4.1 Establish place-based learning strategy

Recommendation # 7

Consider expanding fall and winter offerings/enrolments first before inter-session and summer courses.

Response: The Math/Sciences Department members agree with expanding fall and winter offerings but not with removing Intersession. With financial support from administration, we could provide additional access points to two-term courses; e.g. Bio 103, Bio 160 and Che 110 in Winter term, Bio 102, Bio 161, Chem 111 in Fall

Build 2026: 4.2 Learning and Services (increase access to education and training by offering students flexible learning and service options.

6.2 Integrated Enrolment (market, recruit, and advise strategies to better serve students)

7.4 Enrolment Planning (ensure NIC offers student spaces in the region)

Indigenization Plan: N/A

Widening Our Doorways: 2.2 Optimum enrolment at each location (through enrolment planning, set annual enrolment targets)

3.1a: increase opportunities for student to be directly admitted into their first-choice program.

3.3: Create multiple entry points for each program.

Recommendation # 8

Provide unstructured space for students to gather and work on their own time would be more valuable.

Response: We agree with this recommendation. Scheduled construction and renovation of the lab space should be designed with this in mind.

Build 2026: N/A

Indigenization Plan: Supports the Principle of Indigenous Learning by providing spaces to build relationships and develop community.

Widening Our Doorways: 1.1b Create and communicate safe, effective, meaningful and welcoming learning environments where people want to be.

4.1 Place-based learning strategy operational. If you are providing face to face learning then students will need to have places to share and work on-campus.

Learning Community

Focus: This area focuses on the program as a learning community. This includes interactions and relationships between and among faculty and students within the program, as well as engagement with broader communities (e.g., institutional, regional, discipline, industry, or profession specific relationships).

Recommendation # 9

NIC administration and faculty needs to find some unbiased way to solicit feedback from its students.

Response: We agree with this. Many of us have been using a department developed course evaluation for many years; it is an essential tool for professional practice. Evaluation is particularly important for the first course taught by new instructors.

Build 2026: 2.1 - Teaching and Learning - student assessment of the quality of instruction

Indigenization Plan: Goal 2 Learning Environment and Holistic Services

Widening Our Doorways: 2.1 - Teaching and Learning Strategy operational – initiative b), point 5) formalize data gathering processes for feedback on teaching and learning

Practices

Focus: This area focuses on teaching and learning practices, including assessment and evaluation methods and the alignment of these approaches to supportive practices. This includes the methods or approaches members of the department engage in to fulfil the stated commitments while engaging in reflective practice.

Recommendation # 10

We recommend regular and clear communication between Advising and the faculty members of the program. Inviting Advising to attend at least one department meeting each year would improve communication and keep Advising grounded in current curriculum. "*Two of the four students surveyed suggested NIC advising was unhelpful to them and one of the four only used the website (which only refers students to the BC transfer guide).*"

Response: We are unclear about what process could be put in place to improve communication between advising and faculty. One option may be to have a discipline-specific meeting with advising members once a year to facilitate communication and create meaningful connections. The department has produced "pathways" documents and participated in creation of a Department brochure that was substantively rewritten by Student Services staff.

Build 2026: 5.3 - Self Directed and Customized Learning - # of students with advising support (advisors would have more discipline-specific knowledge)

Indigenization Plan: Building relationships is a Principle of Indigenous Learning and should inlcude multiple aspects of a student's experience at NIC.

Widening Our Doorways: Doorways – Point 3 indirectly discusses customizable, personalized learning – having advisors with discipline-specific knowledge and/or strong connections with faculty in the discipline, students can create personalized and customizable plans

Recommendation # 11

"Advising could prepare course planning documents that outline transfer. For example, "the NIC pathway to a BSc in biology from UVic." The document could list transferable courses the student could take at NIC and any courses they would need to take once transferred to be fully in third year."

Response: The department has already created "pathways" documents. They have not been used by advising, but still exist and could be provided to advising. They could also be used as a framework for one-year certificates.

Recommendation # 12

The program would benefit from better coordinated planning for the use of course development and PD time to ensure both course and program updates and renewals.

Response: We agree that all faculty, particularly those who teach Intersession, have difficulty completing all the curriculum development required to maintain currency in pedagogical and technological advances, as well as twenty-two days of professional development. First, we support a culture of excellence that includes preparation and reporting of an annual plan for curriculum and professional development activities.

We support the recommendation to have one block of time in the College timetable when no classes are scheduled, to support program updates and renewals. Implementation of that recommendation is in the hands of administrators.

Collective Impact

Focus: This area focuses on the accomplishments and contributions of faculty and students from the program. This includes learning experiences, opportunities, and outcomes related to the program. This also includes mechanisms in place to help faculty and students reflect upon and recognize accomplishments.

The external review did not include this section. However, they do share this information in the Program structure section:

"Discussions with faculty and staff, as well as student feedback, clearly showed us that the small class sizes and accessible instructors allowed for personalized support. This is a differentiating factor for NIC, and the program's ability to provide it is a clear asset to the program and to the college."

H. Indigenization of Teaching and Learning Experiences

The Math-Science department has been proactive to implement recommendations of the Truth and Reconciation Commission's Call to Action, notably 62ii: *Provide the necessary funding to post-secondary institutions to educate teachers on how to integrate Indigenous knowledge and teaching methods into classrooms.* We acknowledge that actions toward reconcilation require ongoing education of ourselves as Canadians and educators, and ongoing reflection and renewal of our curriculum to continue to Indigenize our classrooms and curriculum.

In May, 2021, The Math-Science department hosted a week-long Indigenization Workshop with daily sessions to help us learn about Indigenous perspectives and practices.

We see indigenization of the curriculum to include our own learning of Indigenous people, practices and history (instructor education) as well as teaching practices (how we teach) and course content (what we teach). Current practices and future goals are outlined below. This table forms the beginning of an Indigenization Plan, that we hope to discuss with the Indigenization Working Group to gain their insight and direction.

What We Teach		
Course	**Curriculum Topic or Learning Activity**	**Principle of Indigenous Learning[2]**
Most biology courses	Regular reference to local Indigenous people and knowledge is frequent, respectful, and place-based; e.g. use of local species, Kwakwala words for local species. Indigenous ways of knowing are presented (interrelationships between species) in in comparison to Western science classification and separation of species.	Learning recognizes the role of Indigenous knowledge
Bio 102	Stream Lab Series (4 weeks); assignment includes students research of local nations living in the watershed.	Learning is relational; e.g. focused on sense of place
Bio 102 Bio 230	Ecology: examples of natural communities in the local area and reference to functioning ecosystems pre-colonization. Research scientific, western (common), and indigenous names for fish & wildlife. Compare traditional land use by indigenous peoples to western practices e.g., fishing, forestry Field trips	Learning is relational; e.g. focused on sense of place Learning recognizes the role of Indigenous knowledge. Learning involves recognizing the consequences of one's actions. Learning is experiential. Indigenous ways of showing respect for environment
Bio 111	Biodiversity and Ecology: understanding the importance of traditional ecological knowledge with specific examples of clam bed restoration and the coastal guardian watchmen's involvement in research	Learning recognizes the role of Indigenous knowledge
Bio 113	Knowledge of local biodiversity is taught through an indigenous perspective. Comparison of traditional use of waterways and and western practices e.g., fishing Ocean governance and conservation led by First Nations	Learning involves recognizing the consequences of one's actions. Learning is relational; e.g. focused on sense of place Learning is experiential. Indigenous ways of showing respect for environment

[2] www.fnesc.ca

Bio 160/161	Healthy lifestyle choices	Learning supports the well being of the self.
Bio 160/161	Reflective questions on labs and lecture assignments about student learning (metacognition) as well as linking learning to daily life.	Learning is reflective, experiential
Bio 103/160/161	Concept of relationships between body systems, not independent body systems.	Holistic approach to learning, support the well being of the self.
BIO 060/110	Use story to communicate physiological processes.	Learning is embedded in memory, history, and story.
BIO 211	Indigenous use of invertebrates assignment	Learning recognizes the role of Indigenous knowledge.
BIO 211	Stories discussing how Indigenous people of BC are reclaiming land use to increase invertebrate populations (clam gardens, glass sponge reefs)	Learning recognizes the role of Indigenous knowledge.
BIO 103	Guest lecture on Culturally Modified Trees in unit on Plant Anatomy	Indigenous ways of showing respect for the environment.
All Chemistry Courses	Use of copper; extraction of essential oils (thujone) from cedar	
How We Teach		
Most biology courses	Developing community in the classroom. First classes include “get to know you” activities to build relationships and student’s unique interests are celebrated throughout the term.	Learning is holistic, reflective, relational (focused on connectedness, reciprocal relationships)

Most biology courses	The work of learning and memory – developing a culture of excellence where memory is valued. Difference between western science, where all knowledge is to be published and shared and some Indigenous knowledge, which is not shared. The idea that there are more than one way of knowing, and when we think of science, we are thinking of Eurocentric Science that follows the scientific method. But that there are other ways of knowing science.	Learning requires patience and time. Tradition of oral knowledge transfer requires hard work to memorize. Knowledge is power. Some Indigenous knowledge is sacred and not for sharing.
Most biology courses	Metacognition – students are shown how to do self-assessment after quizzes, exams, lab work, so they develop metacognition and personal responsibility for their learning	Learning involves recognizing the consequences of one's actions.
Island Pre-Health Program	Indigenous cultural safety training workshop sets the framework for the program. Sharing with oral stories and relational practice.	Basing relational practice and understanding at the core of the program.
Goals for the Action Plan		
All instructors	Add at least one PD day for continued education about local indigenous communities, history, perspectives and knowledge. Learn the names of the indigenous territories on which NIC campuses are located (especially your home campus) and learn to greet your students in the local indigenous language. Try to add at least one piece of information to each lecture that links content to local nations, species or practices. Have a one-on-one conversation with an NIC Elder in Residence. Complete the San'yas Indigenous cultural safety training course.	
All instructors		

Island Pre-Health (students and faculty)	Participate in Indigenous Cultural Safety orientation sessions (Village Workshop?) - annually as part of fall orientation	

I. Summary

This Final Report summarizes existing work and future goals for biology and chemistry instructors at NIC. For many years, some faculty have been working hard to improve courses, student experiences, and the quality of the credentials that we offer, albeit in isolation for the most part. As a result of the program review process, the faculty have begun to think as a collective; determined to rethink, revalue, and recreate our credentials.

However, we work as a Department, meeting each term to share successes and challenges and often engaging in professional development as a group. We make decisions about department policies together, we socialize together. While dividing Program Review into two pieces may have made the process less cumbersome, it works against development of a cohesive Science Program. We look forward to working on some of our Action Plan goals together, with our colleagues who teach Math, Physics and Engineering, in particular the development of comprehensive Program Learning Outcomes and Program Advisory Committee.

The twelve recommendations from the external reviewers largely support faculty recommendations in the self-study. Neither the Self-Study or External Review addressed Indigenization of the courses and programs. Section H of this Final Report summarizes current work, and provides the beginning of a Department Indigenization Plan.

The accompanying Action Plan document outlines the actions and next steps for the biology and chemistry faculty

Dean Feedback: Provide a final draft to your dean and give them a month to reply with feedback and suggestions. Decide how you wish to incorporate some or all the dean's feedback into the final version. Consult with CTLI if you have any questions.