NORTH ISLAND COLLEGE
NIC

Program Review

Final Report

Math and Physics

Submitted to
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Faculty of Arts, Science and Management

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2300 Ryan Road
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Table of Contents

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**, and **Working Together** – *the NIC Indigenization Plan.* 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 Math, Physics and CPS Program area wrote a self-study and shared with three reviewers who formed the external review team. The reviewers met virtually with various people at North Island College for two days to explore and learn more about the challenges and successes of the Engineering's Foundations Certificate.

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

The Math, Physics and CPS Program area has written this final report summarizing their self-study recommendations, along with their response to recommendations from the external review team.

During the process of the program review a new department has been struck, the Department of Design and Digital Development. This department includes all CPS courses now. Therefore recommendations in regards to CPS courses will not be addressed anymore, as they will be included in the program review of their new department.

This report accompanies an Action Plan report which details action items to undertake the recommendations.

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.

On March 17 and 18, 2022 the external review team convened to review the math, physics, and computer science program areas and meet with various program stakeholders. This document provides a written summation of findings, recommendations, and suggestions at the conclusion of the visit. This document represents the completion of the external review process and findings.

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

This final report is based on the program self-study, the external review report, and responses from program faculty.

C. Program Characteristics

The only credential available for students focusing on the sciences is an Associate of Science (AS) degree. The Associate of Science degree requirements are as follows:

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.

Very few students complete the Associate of Science degree for several reasons. To best meet the needs of students wishing to transfer to a third-year university degree program, accepted requirements would include 18 or more credits (out of 60 required for an associate degree, with 9 being at the second-year level) in a particular subject area. This allows students to establish a subject area concentration prior to entering third year. However, NIC does not have a course mix structure that allows students to earn a specialized Associate of Science degree. For those students that see the Associate of Science degree as a terminal program, the lack of subject areas specialization is a contributing factor to the lack of appeal among both domestic and international students. Given that the Associate of Science degree is the only general credential available (along with the Associate of Arts degree) in the Faculty of University Arts, Science and Management, very few students in University Studies leave North Island College with a credential of any kind. As a result, a program area identity and culture is challenging to create. Students simply take a collection of courses, including both first- and second-year courses, then transfer to another institution to complete their diploma or degree, often after just one year of study at NIC.

The program areas then do not operate as functioning departments within a faculty because they simply exist to offer courses that have no connection to a credential. As one might imagine, this presents a host of problems establishing program culture, because there is no credential or program to focus a vison and direction for enhancement.

This has led to various proposals within the program areas to re-establish a sense of program culture and allow students to feel they are at NIC for more than just taking a collection of unrelated courses. One-year certificate programs have, or will be, proposed that will allow students to gain a credential after one year of study that will ladder into diploma or degree programs at a variety of institutions. A diploma could also be earned in the same subject areas. Students could also earn two certificates at NIC which would then equate to a diploma.
For example, certificates in two separate subject areas (e.g., mathematics and biology) might equate to a General Studies or Interdisciplinary diploma.

Stand-alone two-year diploma programs are also being considered that will offer students the flexibility that the Associate of Science degree doesn't, yet still earn a credential that they can then use to continue their studies at transfer institutions or use to enter the job market. This could be in any specific subject area (e.g., mathematics, physics, or computer science).

Program Areas Overview

Names of Courses Offered within the Math, Physics, and Computer Science Program Areas

Physics and Astronomy

PHY - 050 College Preparatory Physics I (3 credits incl. 3 hour/week lab)
PHY - 060 College Preparatory Physics II (3 credits incl. 3 hour/week lab)
PHY - 100 Introduction to Physics I (3 credits incl. 3 hour/week lab)
PHY - 101 Introduction to Physics II (3 credits incl. 3 hour/week lab)
PHY - 120 Principles of Physics I (3 credits incl. 3 hour/week lab)
PHY - 121 Principles of Physics II (3 credits incl. 3 hour/week lab)
PHY - 141 Mechanics I (Statics) (3 credits incl. 1.5 hour/week tutorial)
PHY - 170 Engineering Mechanics 1: Statics & Dynamics (3 credits incl. 1.5 hour/week tutorial)
PHY - 215 Introduction to Quantum Mechanics (3 credits incl. 3 hour/week lab)
PHY - 216 Introduction to Electricity & Magnetism (3 credits incl. 3 hour/week lab)
SSA - 100 Introduction to the Solar System and Space Exploration (3 credits incl. 3 hr./week lab)
SSA - 101 Introduction to Deep Space Astronomy (3 credits incl. 3 hour/week lab)

Math and Statistics

MAT - 102 Calculus for Life Sciences (3 credits)
MAT - 122 Logic and Foundations (3 credits)
MAT - 133 Matrix Algebra (3 credits incl. 1.5 hour/week tutorial)
MAT - 151 Finite Mathematics (3 credits)
MAT - 156 Applied Mathematics and Statistics for Computing (4 credits)
MAT - 162 Mathematics for Elementary Education I (3 credits)
MAT - 163 Mathematics for Elementary Education II (3 credits)
MAT - 181 Calculus 1 (3 credits incl. 2 hour/week lab)
MAT - 182 Calculus 2 (3 credits incl. 2 hour/week lab)
MAT - 200 Linear Algebra (3 credits incl. 1.5 hour/week tutorial)
MAT - 210 Calculus 3 (3 credits incl. 1.5 hour/week tutorial)
MAT - 214 Calculus 4 (3 credits incl. 1.5 hour/week tutorial)
STA - 115 Introduction to Statistics (3 credits)

In addition to the physics courses listed above, NIC has an Engineering Foundations Certificate program that includes two physics courses not included in this list. For more details of the Engineering Foundations Certificate program at NIC, please visit Engineering Foundations Certificate - Colleges, Vancouver Island, BC (nic.bc.ca).

Computer Science

CPS - 100 Computer Programming I (3 credits)
CPS - 101 Computer Programming II (3 credits)
CPS - 102 Computer Programming with C++ (3 credits)
CPS - 146 Database Fundamentals (3 credits)

In addition to the CPS courses listed above, NIC has launched a new Computer Information Systems (CIS) Certificate program in the fall of 2021. Six new computer science courses have been developed and are offered primarily for that program. However, the CIS program is not reviewed in this program review cycle. For more details of the CIS program at NIC, please visit
https://calendar.nic.bc.ca/preview_program.php?catoid=7&poid=995

D. Summary of Strengths and Challenges

Strengths

Many positive factors contribute to the achievement of learner commitments within the math, physics, and computer science program areas, one of which is its enthusiastic faculty who are strongly invested in student success. Most faculty have completed education degrees or instructional diplomas, in addition to their graduate degrees in their area of specialization.

Through innovation, collaboration, and the continued use of NIC's Centre for Teaching and Learning Innovation, faculty are better able to offer student support with updated perspectives pertaining to education.
Faculty collaborate consistently with each other to be able to provide the best student experience they can.

Small class sizes allow instructors to identify areas where students need additional support or clarification. The small class sizes and informal nature of the class and laboratory instruction also help students to feel more comfortable coming to ask for help during office hours, and many will work in the physics lab or other spaces close to math and physics faculty offices so that they can get the help when they need it.

General Challenges

Negative factors within the program areas that impact faculty's ability to meet learning outcomes stem from a general lack of commitment to long-term planning.

For example, seemingly random administrative changes like modifying the number of instructional weeks for Fall 2021, dropping face-to-face classes on some campuses, and removing various courses and sections, sets faculty scrambling to react and impacts their ability to deliver quality education. Students are aware of this scramble and are negatively affected.

The administration is not willing to run new courses with low enrollment numbers for the first one or two years, therefore the students cannot rely on the course being offered, hence the enrollments stay low for the following year as well. This is also discouraging for faculty who spend a lot of time and energy on developing new courses to only see them cancelled before they run.

The math, physics, and computer science program areas are not a program, and as such offer a less coherent approach compared to other departments, creating course delivery challenges as most courses are offered as stand-alone options.

Other factors negatively impacting the program areas stem from computer science and related courses being spread out over two departments/program areas (math/science and fine arts), while this presents obstacles in creating consistency, it can also represent a benefit to some students. (Since we started the program review process this has changed. All CPS courses have now joined into a newly formed department called Digital Design and Development Department.)

As it is difficult to plan pathways for every possible degree and institution combination that can be initiated at NIC, potential and incoming students would benefit from more easily accessible and consistent information that details possible educational directions. This information could be shared on the NIC website. A good example of this can be found on the Faculty of Education page on UVic's website.

Challenges that Fall Beyond the Scope of Program Review

Recent reductions in domestic enrolments across the board is negatively impacting enrolments in physics and mathematics. Due to economic factors beyond the scope of the program, with increased wages and need for employees, fewer students are attending post-secondary education.

Effects of the COVID pandemic have impacted overall funding availability (college-wide, province-wide), which can negatively impact program development and lab renovations.

Difficulties exist in recruiting qualified faculty members. Single course postings for sessionals can be especially challenging, due to lack of available housing and inability to move with ease. Lower wages compared to other job sectors may also hamper recruitment.

E. Self-Study 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.

Recommendation #S2:

Commitment and consistency to planning courses across years

- Plan a 2- to 3-year schedule of courses (more commitment from college administration to administer this plan is needed and will benefit the program areas). Students need to know what courses are offered to feel confident while planning their post-secondary learning at NIC.
- Senior administration to more carefully consider the cancellation of low enrollment courses to provide a sense of stability in course scheduling for students and faculty

Recommendation #S14:

Maintaining lab presence at all campuses (this has been added after the self study finished)

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 #S1:

Curriculum renewal – time to plan, develop, and discuss

- Dedicated time to discuss ideas and plans for the upcoming year as a group so that efforts can be coordinated and combined. This would require a block of time (1 ½ hours) where no program areas have scheduled courses.
- Instead of having faculty teach during intersession, have the option to work on needed curriculum development during that time.
- Release for faculty to do major curriculum renewal during the year.

Recommendation #S6:

Improve student retention from fall to winter semesters
- Offer traditionally first-semester courses (i.e., MAT 181) in the winter so that students don't lose a year waiting for a fall offering. Also, this strategy would be enhanced if the following and corresponding winter term course was offered over the summer. The survey conducted in the Spring of 2021 (Math, Science, Computer Science Current Student Survey, 70 responses, Feb 23rd - March 11th, 2021) found that 80% of

students would like NIC to offer more courses in the spring and/or summer terms (see Chart 4). The top response was "Yes, in either the intersession times or the full summer semester" at 51%.

- Offer a short 3-week calculus prep course in August and November to ready students for MAT 181 in fall and winter terms.

Recommendation #S7:

Add/offer additional math, physics, and computer science courses to support programs where our students are transferring (i.e., engineering, computer science, physics, and math at UVic)
- Second year calculus (will be offered again in the fall and winter of 2023/2024)
- Second year engineering and math
- Second year stats (calculus based)
- Second year physics
- Intro to data science (UVic - STAT 123, UBC - DSCI 100)
- Second year discrete mathematics
- Second year data analysis with python course

Recommendation #S9:

Some type of delivery mode (either ITV or a version of Hyflex) to include multi-campus and off-campus learners
- PHY 121, PHY 141, and PHY 170 are being piloted in Winter 2022

Recommendation #S10:

Multiple delivery modes for courses with more than one section (face-to-face, digital synchronous, and asynchronous delivery)
- Offer two sections for more courses, so one section could be Face-to-face delivery and the other section could be digital synchronous or asynchronous delivery.

Recommendation #S11:

Certificate of Data Analytics, include courses like:
- MAT 133/200
- CPS114
- CPS 146
- BUS170 or intermediate Excel
- New course: data visualization

Recommendation #S12:

Offer a **Foundations of Science certificate;** a one-year certificate where students can choose between six different streams (see APPENDIX B in Self Study).

Recommendation #S13:

Offer an **Elementary Education Foundations certificate** in collaboration with different departments.

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 #S3:

Explore the possibility of different dual admission programs so students can seamlessly transfer into a bachelor's program at UVic or VIU.

Recommendation #S5:

Improve communications regarding NIC and the program areas' possible pathways
- Share potential pathways and possible career paths with students, parents, and high school teachers to clarify how NIC can fit post-secondary plans. This could happen through instructors getting invited to schools for a lecture (assuming they would get compensated for that extra work) and parent and student information nights hosted by high schools and attended by faculty.

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 #S4:

Expand classes to include tutorial time (4.5 hours/week) for math, statistics, and physics

- The addition of 1.5 hours of tutorial time would greatly benefit students and increase their success rate. A survey conducted in the Spring of 2021 (Elective and Required Course Survey - Arts, Sciences and Technology, 55 responses, March 22nd - April 2nd, 2021) found that 47% of students find they have insufficient time to study (see Chart 3).

Recommendation #S8:

Enhance physics and space sciences astronomy lab space
- Enhance lab space as part of ongoing plan

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.

No recommendations from self-study addressed this point.

F. Summary of Key Findings from the External Reviewers

The external review team commended faculty in Math, Physics and Computer Science for their dedication to their learners as well instructor accessibility and commitment to personalized support. A focus on innovative distance learning, Hyflex courses, and expanding the use of open educational resources were also highlighted as positive features.

Some of the key areas of improvement center around a continued commitment to face-to-face instruction in addition to the Hyflex/distance offerings, creation of certificates and diplomas, expanding course offerings, creating student feedback and evaluation as well as improving the planning and structure of our course development and professional development.

Recommendations of the External Reviewers:

1. Prioritize face-to-face delivery methods and offering multiple delivery modes (Hyflex/distance) for courses with more than one section to improve accessibility.
2. Create a two-year diploma and a 1-year certificate.
3. Develop new courses.
4. Program/course alignment with receiving institutions.
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. Regular and clear communication between Advising and the faculty members of the program.
11. 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.
12. Regular and formal faculty and course evaluations.

G. Program Response to External Reviewers' Recommendations

Commitment to Learners and Program Structures

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.

Recommendation #1

Face-to-face and distance learning

We agree with faculty that face-to-face instruction should be prioritized as the delivery method. However, we strongly recommend a commitment to Hyflex for math-sciences in order to serve all campuses while maintaining face-to-face labs on each campus. This will help to reach students on campuses that have low enrollments.

Using multiple delivery modes for courses with more than one section would provide options for students and improve accessibility. 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.

- Summary: prioritize face-to-face but use hyflex where not otherwise viable.
- Response: Agree, but we want to make sure that the assessment structure between different sections is equivalent and consistent. This is what we have been doing since the beginning of ITV. Also relates to our Self Study recommendations #S9 and #S10
- Aligns with: Build 2026 – 4.2 Learning and Services and 4.3 Pathways to Learning & Widening our Doorways 2026 - 3.2 and 3.4

Recommendation #2a

Certificates and diplomas

Creating exit certificates and diplomas is strategic for both the program and the college. Such certifications would promote student success and retention, providing them with an opportunity to complete a credential that aligns well with their goals, and providing clear paths to other institutions. Though the Associate of Science degree provides this option for some students, less restrictive pathways would increase access for a wider range of students. These credentials would also support marketing and recruiting, particularly a two-year diploma that would serve the international student market. Certificates and diplomas would also help to strengthen cohort and community within the program.

- Summary: Create one year certificates that correspond to first year of each subject area at main receiving institutions.
- Reaction: Agree. Easier for marketing. Easier for advising/ student planning. Increase visibility of offerings. Be able to track students in their further studies as they will be alumni. Check that pre-requisites align with receiving institutions (see recommendations in the next section on Program and course alignment with receiving institutions. This also relates to our Self Study recommendations #S5, #S12, #S13

- Aligns with: Build 2026 – 4.1 Program Entry, 4.3 Pathways to Learning, 5.3 Self-directed and Customize Learning (increase number of short-term credentials and programs) & Widening our Doorways 4.2

Recommendation # 2b

It has to be noted that offering 2-year diplomas or strengthening the Associate of Science degree at NIC are critical for recruitment of international students. These students are advantaged in the immigration system by a two-year credential and thus are selecting institutions based on that. Allowing for a more flexible 2-year diploma will increase options for these students, especially since we have heard that due to course cancellations it might be hard for students to fulfil the current Associate of Science degree in two years.

- Summary: offering 2-year diplomas or strengthening the Associate of Science degree at NIC are critical for recruitment of international students
- Reaction: Agree. If we want a variety of options for students we need a variety of subjects (Math / Phys / Comp Sci) represented in the 2nd year offerings. This also relates to our Self Study recommendations #S2 and #S7
- Aligns with: Build 2026 – 5.4 Global Learning

Developing certificates and diplomas will require the development of program learning outcomes. This would require a review of current authorized course description (ACD) forms, to ensure that the course-level learning outcomes on the ACDs are in line with the program-level learning outcomes.

We specifically recommend in the short term to develop certificates. See Appendix B of math/physics/computer science self-study. See also recommendations 11, 12, 13 in the math/physics/computer science self-study. A first-year certificate should be possible without adding further courses, providing an easy no-cost option and all the potential benefits listed above. The only potential downside might be if students perceive their educational experience to be done after first year (obtaining their certificate) and transfer prior to second year.

We further recommend in the long term to develop diplomas, or one-year certificates that can be taken in combination. These might be most helpful to students if tailored to receiving institutions and program areas. Credentials will ensure that students take a breadth of courses that will improve their chances of successful transfer to a receiving school to complete their bachelor's program.

Recommendation #3

Developing new courses

We have heard that no new courses can be added due to budgetary concerns at the present time. However, should enrollments increase (maybe due to international recruitment), addition of a selection of additional 2nd year courses could be considered.

Creation of a statistics course that transfers to VIU as Math 203 would increase transferability. NIC advising supported this recommendation.

- Reaction: Agree (Though we cannot add courses – see above – we could package courses in a certificate in Elementary Education with other departments. May apply a STEM focus to the credential. See self-study S7 and S13))
- Aligns with: Build 2026 - 3.2a Increase first-year student retention

We recommend the program focus on expanding first year courses and transferability of courses before adding additional second year courses, other than the one above. Increase transfer relationships and marketing of NIC as a university transfer option to create more demand for remaining second year courses before expanding.

- Summary: Increase transfer relationships and marketing of NIC as a university transfer option to increase first year student enrollment
- Reaction: Agree See self-study S7
- Other thoughts: Review current first year courses to see if we can tweak courses to broaden transferability.
- Aligns with: Build 2026 - 3.2a Increase first-year student retention

Recommendation #4

Program and course alignment with receiving institutions

We asked the faculty to reflect on the necessity of course labs, prerequisites, and relative difficulty of their courses. In consideration of the expense and viability of their 2nd year offerings, reconsider having added lab sections to 3 credit courses, especially where the university course transferred to has no labs. In the same vein, prerequisites of transferable courses should be compared with those of the receiving institutions; if NIC has additional prerequisites this could be limiting students' opportunities. Departments should work together across the institution to ensure that the standards of courses are consistent with those of UVic and VIU.

- Reaction: Already addressed in previous section
- Aligns with: Build 2026 – 4.1

Recommendation #5

Dual credit with high schools

If possible, expand dual credit offerings with local high schools; the faculty have many ideas of how to expand existing partnerships or bring back previously developed relationships. This might require flexibility in scheduling.

- Reaction: seems straightforward, but details of arrangements with the School Boards are challenging to work out. Start by faculty building connections with the teachers in the high schools? (make sure dual credit options that exist are more broadly known).
- Aligns with: Build 2026 – 4.1 Program Entry, 4.3 Pathways to Learning, 9.1 Serving the People of the Region; WoD Point #3

Recommendation #6

Course and lab scheduling

To assist students and instructors with planning, we recommend the program publish a 2-year schedule of courses. This would also allow for certain courses to be offered every alternate year, as suggested in the Math, Physics, and Computer Science self-study. To avoid prolonging students' studies, this would need to involve commitment from the college to run those courses even at low enrolment.

- Summary: publish a 2-year schedule of courses
- Reaction: Strongly agree. Students can't choose to stay for a second if they can't plan until the end of the first year, and students who plan to spread their first year over two years can feel more confident.
- Aligns with: Build 2026 – 3.2 Student Support and Persistence; 4.3 Pathways to Learning; 5.4 - Global Learning; 9.3 - Social and Economic Development of the region; WoD Point #3.6

We recognize a need to review the scheduling of labs to improve utilization as well as access. Scheduling labs in the evenings might also improve access for students.

Recommendation #7

Consider expanding fall and winter offerings/enrolments first before inter-session and summer courses. Offer traditionally first-semester courses (particularly core or pre-requisite courses) in the winter both for students who do not pass in the fall and for students who start their studies in January (which is common for international students in particular).

- Reaction: Most courses have too low an enrolment. MAT 181 in the winter and MAT 182 in the spring/summer? (option to do this when the pre-health program starts?)
- Aligns with: Build 2026 4.2 Learning and Services; WoD # 3.3

Recommendation #8

In response to recommendation #4 from the Math, Physics, and Computer Science self-study, we believe that expanding classes to include tutorial time is unlikely to address students' concern about insufficient study time. Providing unstructured space for students to gather and work on their own time would be more valuable. We cannot recommend adding a formal tutorial section for math, statistics, and physics courses.

- Summary: Provide study space for students
- Reaction: In the planned lab re-structuring (We didn't receive the amount of funding we asked for, so we are not sure if this will be part of the planned lab renovation anymore at this point.)
- Aligns with: Build 2026 2.4 Campuses and Centres, WoD 1.1 b)

Develop short- and long-term plans with the consideration of items based on financial considerations (less than 1 year, greater than 1 year, no cost, low cost, high cost).

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

Student feedback should be a primary focus. NIC administration and faculty needs to find some unbiased way to solicit feedback from its students. We understand there are union-related issues with soliciting feedback from students, however, it is in the best interest of NIC faculty to have student feedback when decisions are made about institutional direction. We recommend both faculty and administration to commit to finding a resolution in this regard for the good of the college. An annual institutional student survey could also be created that asks students short or multiple-choice questions about their background, goals and needed support (not about individual courses).

- Summary: More data, similar to what was collected for the self study would be useful.
- Reaction: Agree. And adding first year credentials will help with this.
  - Since we received this report the CTLI has created a Student Learning Experience Survey that can be included in Brightspace. This is an optional survey that allows instructors an easy way to receive anonymous feedback from students both during the semester and at completion of the course.
- Aligns with: Build 2026 9.2 Community Engagement; WoD Point #4 Program Response & Renewal

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

Advising

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. During our virtual site visit, we heard of some issues around transferability of some courses and Advising also receives informal feedback from students that would be useful for faculty members to hear.

- Reaction: Building relationships with advising (better information flow both ways) would be beneficial. Ensure that any documents developed are clearly dated so they don't get used accidentally many years in the future.

- Aligns with: WoD Point #2 Enhancing Student Learning Experiences; Build 2026 #3.2 Student Support and Persistence; NIC Indigenization Plan Teaching and Learning Goal #5

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). Students need to be provided with a clearer understanding of transfer from NIC to receiving institutions. The development of certificates and diplomas may help in this respect.

- This highlights the broad usefulness of more 1-year certificates

In the meantime, Advising could prepare course planning documents that outline transfer. For example, "the NIC pathway to a BSc in physics 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. These documents could be posted on the website as they are created for individual students (if workload is a problem for implementation) and then should be reviewed each year for accuracy. It is possible with an improved understanding of how transfer will work, more students may choose NIC. Also, when students transfer and must take one or two or more second-year courses they will not be surprised (and therefore dissatisfied with NIC).

Recommendation #11

Course Development and Professional Development

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. This might include preserving intersession time for development activities, scheduling courses to allow for a block of time with no scheduled courses during which faculty can meet and providing release time when a faculty member is involved in significant program or curriculum renewal.

- Summary: Ensure there is sufficient time for required course development, and work with scheduling to ensure that faculty in the program area has an opportunity to meet
- Reaction: Strongly agreed. Note that Fridays don't work for our dept. due to the large number of Friday labs ("meet Fridays" is the usual reaction to this request).
- Course and program development can take many forms from modification of current assessment tools to full on New Program development. Of course these require differing inputs of time and effort. It is important for us to be mindful of striking a balance between faculty autonomy and coordination. The benefits of coordination allow for sharing transferable gains to fellow faculty members. This can happen in both formal and informal ways. For some faculty, courses are under constant development with modifications implemented throughout the academic year. Others choose to focus on CD in defined concentrated periods (often during Intersession)
- Similarly, the benefits of faculty PD activity are often useful to other department members and opportunities for a more-than-superficial sharing should be clarified.

Recommendation #12

Again, it is imperative that faculty and courses be evaluated regularly and adequately. Regular and formal faculty and course evaluations are critical for evaluating and improving course and assessment structure. In the absence of a formal evaluation framework at the college level, the program chair and individual instructors have been attempting what they can through informal student surveys, but it was clear from our conversations with stakeholders that these informal surveys are not adequate to the purpose.

- This is above our paygrade: Neil? NICFA?
- Evaluation of both faculty and individual courses can take on a number of forms: self-evaluation, evaluation by students, peers or administration/external. The establishment of a 'formal evaluation framework' must be preceded by clarity regarding the responsibilities and limitations of each of these stakeholders. It remains unclear how this can or should be initiated at the department level.

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.

No recommendations from the external report addressed this point.

H. Indigenization of Teaching and Learning Experiences

Efforts have been made to address the traditional power dynamic in the MAT 181/182 (calculus 1 and 2) classroom. Learners engage in a learning cycle that involves extensive feedback, revision, and reassessment, and they have several opportunities to explore topics of their own interest in the context of special projects. There is an emphasis on collaboration during class meetings. Learner agency has been expanded by allowing students some choice in the topics on which they wish to focus outside of the core content.

In STA 115 and MAT 122 a more holistic and diversified assessment approach has been incorporated by the inclusion of two stage assessments (incorporating individual and group assessments). This technique creates an inclusive learning environment where assessment is positive and part of the ongoing learning process. In addition, students are provided the opportunity to share their unique understanding and perspectives in class, which encourages connection and the building of relationships. In STA 115, applications of statistics for social justice are incorporated throughout the course.

In the spring of 2021, the whole Math and Science Department organized and participated in a week long indigenization PD activity. We had a few guest speakers to inform us on their approach of including indigenous content into their courses. A number of faculty have been using that as a steppingstone to work on indigenizing their curriculum.

Some future ideas in this area include science and math outreach events to local schools or indigenous schools including indigenous mathematical activities and games (Bentwood Boxes, Indigenous logic games, etc). Similar activities and games could also be applied in our Mathematics for Elementary Education courses (MAT 162 and MAT 163).

I. Summary

The impact of this self-study on faculty has been extensive. For many years 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 self-study process, the faculty of the Program Area of Math, Physics and Computer Science have begun to think as a collective; determined to rethink, revalue, and recreate our credentials.

The 12 recommendations from the external reviewers not only supported those presented in the self-study but challenged the faculty to celebrate not only the success of our students but the faculty and the work they do to enrich the lives of those students.

The accompanying Action Plan document outlines the actions and next steps that Math, Physics and Computer Science will take.