Final Assessment Report
Business Administration and Computer Science Double Degree (BBA/BCS)
August 2018

Summary of the Program Review:

In accordance with the University Institutional Quality Assurance Process (IQAP), this final assessment report provides a synthesis of the external evaluation and the internal response and assessments of the Business Administration and Computer Science Double Degree Program (BBA/BCS) delivered by the David R. Cheriton School of Computer Science at the University of Waterloo and the Lazaridis School of Business and Economics at Wilfrid Laurier University. A truncated self-study was submitted to the Associate Vice-President, Academic on September 7, 2017. Both Laurier and Waterloo independently completed Self-Study Reports for their programs in 2013, but did not include a review of the Double Degree program. Hence, this report focused on the unique characteristics of the BBA/BCS program. The self-study presented the program description, an analytical assessment of this program, including the data collected from an alumni survey and the standard data package, which was prepared by the Office of Institutional Analysis & Planning (IAP).

The review was conducted solely from Waterloo's perspective, and thus, with permission of the Quality Council, the site visit was completed by internal reviewers. Two arm's-length internal reviewers were selected by the Associate Vice-President, Academic: Dr. Paul Fieguth, Professor and Chair, Systems Design Engineering, and Dr. Johanna Wandel, Associate Professor, Geography and Environmental Management.

Reviewers appraised the self-study documentation and conducted a site visit to the University on November 29, 2017. The visit included interviews with the Associate Vice-President, Academic; Dean of Mathematics; Director of the Cheriton School of Computer Science (UW); Director, Undergraduate Business Programs (Laurier); Director, Undergraduate Studies (CS), as well as faculty members, staff and current undergraduate students from both institutions.

This final assessment report is based on information extracted, in many cases verbatim, from the self-study, the reviewers' report and the program response.

Program characteristics:
This Double Degree program, begun in 2010, enables students to complete two undergraduate degrees: a Bachelor of Computer Science (BCS) from Waterloo's David R. Cheriton School of Computer Science, and a Bachelor of Business Administration (BBA) from Laurier's Lazaridis School of Business and Economics.

Summary of strengths, challenges and weaknesses based on self-study:

Strengths

- Students receive two excellent degrees and are well-prepared for careers that exist at the intersection of the two degrees.
- The demand for the program is strong with a large number of applications from high quality students.
- A noteworthy success has been its admission of female students: the UW-based classes admitted in the past three years both had notably more women than those of previous years. In particular, the UW-based classes first enrolled in 2015 and 2016 had 30.4% and 32.1% women, respectively; those for the non-double-degree UW cohort in Computer science had 25% women in both of those years.

Challenges

- Administration: Coordination of the program across the two schools requires frequent communication. While relations have been good, different priorities exist at both institutions, and of course, each institution has its own policies.
    - Scheduling: there is currently very little coordination between the scheduling systems of the two schools to ensure that course and exam schedules are conflict-free for the students in the BBA/BCS program.
    - A foreseeable challenge would be a significant curriculum change to one of the schools, which could disrupt the delicate course equilibrium that now exists: we currently work very hard to ensure that required courses are equally split between the two universities.
- Student imbalances. When the program was created, the goal was to have an equal number of UW-based students and WLU-based students. Since its inception, there have been more UW-based students, though WLU is catching up. In general, Waterloo has been more attractive to students because of the superior co-op opportunities and the ability of students to remain in a co-op program if they switch to a single degree BCS.

  This imbalance increased the pressure to admit more WLU-based students, which in turn led to differences in admission standards, as is discussed in the next section. However, even if the number of students admitted were identical, an imbalance would result from different retention rates.

There is an agreement to transfer funds between the two schools to compensate for the tuition and grant from the ministry when the programs are imbalanced. The formula employed is designed to make the universities have no preference where students are registered, but since the transfer occurs at the Faculty level, there has been internal UW pressure to keep balance – the money comes into the university at the top, but the transfer out happens from the Faculty of Mathematics.

Weaknesses

- Admissions: Because each school admits students to the program, there have been discrepancies between the two admissions policies. Standards enforced by WLU were weaker than those at UW for the first few years of the program, resulting in poor outcomes for the weaker students: in particular, a larger fraction of the students who left the program for academic performance reasons in that period were based at WLU.

  In the past few years, there has been an effort made to standardize admissions across the two universities, but stubborn differences have persisted. For example, it was recently discovered that Waterloo adjusts admission scores for students that repeat high school mathematics courses, whereas Laurier was not making this adjustment. The two institutions are working together each year to align processes and resolve discrepancies as issues are identified. For example, there is now some coordination in marketing and communications although there still are substantial differences in how the two universities represent the program to prospective students. Given the flagship nature of the BCS for Waterloo, it is essential that only the highest-quality students be admitted to the double degree program, especially as CS at Waterloo limits transfer opportunities from other Waterloo programs.

- Co-op: As noted, UW-based students can only participate in the Waterloo co-op system and vice-versa for WLU-based students. In general, Waterloo has stronger co-op opportunities in CS and Laurier has stronger opportunities in business and finance. This has been a source of frustration for students who want to pursue co-op postings in both areas.
- Retention: Each year, many students leave the program, typically switching to a single degree at UW or at WLU. Students often switch because they have lost interest in one of the degrees and/or they desire more electives and flexibility. According to our advisors, because students know they can switch after they have been admitted, they often apply to the double degree program half-heartedly with a much stronger inclination toward one of the degrees.

  Advisors also report that UW-based students are more likely to switch to a single BCS, often frustrated with the delayed CS content and co-op stream inflexibility. WLU-based

students are more likely to switch to a single BBA, often because they find the math and CS content overwhelming.

It is not clear that this is a problem that is easily solved: students who discover that their interests are more narrow are not really making a bad decision, and students who find one of their two degree programs too challenging are similarly making a smart decision to switch to a single-degree program. Still, the program has notably poorer retention than might be expected considering the strength of the admitted students.

- Delayed CS content. Students in the BBA/BCS program take their CS courses notably later in their program than students in the single-degree BCS program. This is because the BBA program is a cohort-based program with students taking mandatory courses in specific terms. The schedule has 16 BUS and ECON courses scheduled in the first three years. These require a total of 7 prerequisites from the Math core, meaning that 17 courses in the first 2 years, and 23 in the first 3 years, are pre-set, and are not CS courses, leaving little room.

  Since the normal course load for a student is five courses per term, this leaves room for only 3 CS courses in their first two years and a total of just 6 CS courses in their first three years. The BCS degree has 2 first year courses and 5 second year courses, so a BBA/BCS student may not be able to complete their second year of CS courses until their fourth year of the program. This is unsatisfactory for many students, and so they often "overload" (take six courses per term) or take courses while on co-op.

  There is an opportunity to develop a solution that accommodates the cohort-based system of the BBA, but introduces CS content in a timelier manner. Similar to the model of co-op streams, students could select between two course sequences (*e.g.,* in their first year). The first sequence would be the existing schedule, where the first three years of the program are synchronized with the first three years of business courses. The alternative stream would stretch the first three years of the business courses over four years. The alternative stream could still have business courses scheduled during specific terms to facilitate planning and scheduling at Laurier, but be flexible enough for students to alter their co-op sequence if desired. Waterloo has begun to discuss this possibility with colleagues at Laurier.

Summary of key findings from the reviewers:

The BCS at Waterloo and BBA at WLU occupy similar positions on their respective campuses: both attract top-tier students, and the double degree students represent approximately 10% of the total students in their respective BCS and BBA degrees. The WLU BBA program is nationally known and recognized; the UW BCS program has international recognition. While the reviewers

were very impressed with the program, recommended areas to monitor include student retention including differential retention rates between UW and WLU, marketing the business angle more explicitly at Waterloo, and tracking the steadily growing number of alumni.

Program response to reviewer recommendations:

1. **Formalize the agreement between the UW BCS and WLU BBA degree programs via a double degree Terms of Reference, with associated Program Committee. Ensure that students are represented on the program committee.**

   Response
   Program representatives have met with counterparts at WLU, and intend to establish a single committee for both the BMath and BCS double degree programs (since the BBA degree the students are receiving is the same one for both); WLU prefers that this committee be a single point of contact for petitions, operations and curriculum matters. UW will follow up with WLU colleagues and with the Math/Business unit at Waterloo to formalize terms of reference for this committee. It is the WLU preference not to make a formal agreement for the double-degree programs, to keep the process nimble.

2. **Enhance program marketing on the UW side to better capitalize on the business opportunities and WLU's position relative to other business programs.**

   Response
   A few years ago, both universities developed a one-page recruiting flyer for the BBA/BCS program, highlighting advantages of both universities, but this wasn't a priority for WLU to keep up. UW will incorporate the WLU logo and information in promotional materials in the upcoming cycle, and re-engage WLU's marketing group.

3. **More deliberate program advising, including dedicated program advisors at WLU, and greater involvement of program advisors in connecting students for mentoring/mentee opportunities.**

   Response
   It is anticipated that this may come out of the operating committee. In particular, at WLU, currently the Associate Dean participates in the petitions conversations for double-degree students. With a single program committee, it will instead include a single advisor who will be up to speed on all regulations for students in the double-degree programs.

4. **In careful collaboration with WLU, develop an alternate optional course sequence to provide earlier CS content. In so doing, care should be taken to preserve the cohort-building aspects of the current program. Maintenance and enhancement of cohort**

building could be achieved through dedicated offerings or sections of upper year CS courses at UW.

Response
WLU colleagues are willing to discuss this in the new program committee, but did not appear particularly enthusiastic. In particular, they have not made this kind of change for their own BBA/BCompSci double degree program with the WLU Computing and Physics department. It's clear that the right forum, though, will be the program committee.

With respect to the BBA/BCS students having common upper-year sections, this is probably infeasible since they take courses such as CS 490 or 492 in the term of their choice at UW, sometimes as early as third year. That said, the program doesn't believe this objective is particularly necessary: many students in 490 and 492 are double-degree students, and given that the courses are also electives, students that aren't from the double-degree program are likely to still share a lot of the same interests as the double-degree students.

While the recommendation suggests common sections for upper-year courses, the program will also move to having common first-year sections for the incoming class in Fall 2018.

5. **Conduct exit surveys or interviews with all students who leave the double degree program before graduation. There is a need to identify both why students leave the program and their destination.**

   Response
   CS is in the process of developing an exit survey for students who leave our programs in general, originating with our Women in CS group. The program will incorporate students who leave the double-degree program into that general program for all students who leave CS.

Recommendations that were not selected for implementation:

6. **More coordinated communication between the two home bases during the admissions and offer acceptance period.**

   Response

Turning over lists of admitted students turns out to be largely impractical, because of the short time frame for the final round of acceptances. While it is legal for the two institutions to exchange lists of applicants and acceptances (verified by Waterloo's Privacy Officer), WLU would be making final acceptances basically at the same time as UW. There is an attempt to harmonize admissions standards, and WLU is intending to start incorporating more factors outside marks into admissions (such as penalizing repeated courses and incorporating extracurricular activities) in upcoming cycles, so that may help with keeping standards similar.

7. **Continue and explore expansion of the co-op exchange, particularly for WLU-based students, even if this leads to more co-op fees. Ideally, expand the opportunity to two terms per student.**

   Response

   The truth is that this exchange program isn't working. There are essentially no students from UW who are going to WLU, and the WLU-based students who have come to UW have not all done as well in the matching process as have the UW-based students, which means that UW staff are expending a lot of effort on students who aren't paying UW fees.

   There's no evidence that better marketing from WLU will convince UW students to go there for a co-op exchange, and there's zero willingness on WLU's behalf to allow WLU-based students to pay fees to a different university for co-op services (and, truly, not much willingness at UW either). UW Cooperative and Experiential Education staff, have indicated to the program that they don't anticipate renewing the co-op exchange.

8. **Enhance alumni engagement for all double degree graduates regardless of home base.**

   Response

   Because CS graduates several hundred students per year and Math graduates over a thousand, and there is only one alumni affairs officer in Mathematics, double degree students are incorporated into the general alumni engagement program. That said, Math's alumni affairs officer confirms that graduates from both home schools are engaged with the alumni relations program. However, due to the newness of the program, there has not been a lot of alumni relations work done with BBA/BCS graduates.

Implementation Plan:

	Recommendations	Proposed Actions	Responsibility for Leading and Resourcing (if applicable) the Actions	Timeline for addressing double degree Recommendations
1.	Formalize the agreement between the UW BCS and WLU BBA degree programs via a double degree Terms of Reference, with associated Program Committee. Ensure that students are represented on the program committee.	UW program representatives have begun discussions with WLU regarding petitions/operations/ curriculum committee for both the Math and CS double-degree programs.	Dan Brown and Ilham Akhundov from UW; Shelley McGill from WLU	Fall 2018
2.	Enhance program marketing on the UW side to better capitalize on the Business opportunities and WLU's position relative to other Business programs.	This will be implemented in our marketing materials for F18.	Monique Bevan (CS) and other marketing staff	Fall 2018
3.	More deliberate program advising, including dedicated program advisors at WLU, and greater involvement of program advisors in connecting students for mentoring/mentee opportunities (UW already has this)	This is being suggested to WLU counterparts; perhaps this will result from the new program committee for double degrees.	This is a WLU-specific recommendation; we can only offer advice to our colleagues at WLU via the new program committee for double degrees.	N/A

4.	In careful collaboration with WLU, develop an alternate optional course sequence to provide earlier CS content. In so doing, care should be taken to preserve the cohort-building aspects of the current program. Maintenance and enhancement of cohort building could be achieved through dedicated offerings or sections of upper year CS courses at UW (to allow CS courses to come earlier).	This will be negotiated in the new program committee; it is, however, largely a WLU issue.	Program committee members.	Fall 2019
5.	Enhance alumni engagement for all double degree graduates regardless of home base	An exit survey for all students who leave CS is currently being developed; this will in particular be given to those who leave the double-degree program.	Women in CS committee, CS undergrad office	Fall 2018

The Department Chair/Director, in consultation with the Dean of the Faculty shall be responsible for monitoring the Implementation Plan.

UNIVERSITY OF WATERLOO

Date of next program review: 2020-2021
Date

Signatures of Approval:

Chair/Director — Date: 27 Jul 18

AFIW Administrative Dean/Head (*For AFIW programs only*) — Date

Faculty Dean — Date: 2018-08-09

Associate Vice-President, Academic — Date: August 21, 2018
(For undergraduate and augmented programs)

Associate Vice-President, Graduate Studies and Postdoctoral Affairs — Date
(For graduate and augmented programs)