UNIVERSITY OF CALGARY

Bachelor of Health Sciences
Cumming School of Medicine
University of Calgary

Curriculum Review
Public Report

January 2019

Program Context

The Bachelor of Health Sciences (BHSc) is a four-year, undergraduate honours degree program offered by the Cumming School of Medicine in collaboration with other faculties at the University of Calgary. BHSc students undertake one of three majors: Bioinformatics (BINF), Biomedical Sciences (BMED) and Health & Society (HSOC). Driven by an inquiry-based, research-intensive pedagogy, the BHSc program incorporates the concept "From Cell to Society" to create the future leaders in health science.

In our expanding knowledge-based global economy, competency in research skills, problem solving ability and the capacity to learn allow for rapid adaptation to ever-changing environments. Increasingly, work settings are team-oriented and cross-disciplinary in nature. The broadening complexity of the health sciences enterprise requires the ability to tap into the expertise of many disciplines in the search for creative and innovative solutions to large problems. Although depth in a given discipline remains important, a breadth of educational experience is critical to participate effectively in the highly integrative environments that define the modern industrial, governmental, non-profit, clinical, and academic sectors. In response, the driving philosophy of the BHSc program emphasizes the importance of the integration of biomedical sciences, bioinformatics and social sciences as key areas focus as we address challenges in human health.

Established in 2003, the BHSc program's mission is to produce graduates who are prepared to work in and thrive in interdisciplinary teams as they address complex questions related to human health, solve technical and theoretical problems, and excel at critical thinking. These capabilities position BHSc graduates to become leaders in the dynamic health sector, encompassing health research, public service, and service delivery. Their work helps solidify the University of Calgary's leadership position among Canada's top research-intensive universities and promotes our University's intention to be a global intellectual hub.

Although many universities may offer undergraduate programs in the fundamental elements of biomedical, computational, and social sciences, the BHSc program uniquely incorporates self-directed, experiential, and interdisciplinary learning as a core curricular tenet. The development of key skills—particularly with regard to student-led inquiry, effective oral and written communication, critical analysis and synthesis skills—position graduates effectively for a broad spectrum of professional or graduate post-secondary degree programs and careers in government and private sectors.

Program Structure

The BHSc program is a unique inquiry-based, interdisciplinary and research-intensive undergraduate health sciences degree offered by the Cumming School of Medicine. In integrating the diverse research areas that relate to human health, the BHSc program centres on three major areas of focus: biomedical sciences (BMED), bioinformatics (BINF), and health and society (HSOC). These programs are linked by a

common inquiry component. The structure is designed to produce graduates with highly developed core competencies in their chosen major of health sciences research, while also emphasizing the importance of applying their knowledge to the broad spectrum of health-related issues.

Each major of the BHSc program has a defined program of study that builds disciplinary competency. For the Biomedical Sciences major, this includes establishing foundational knowledge in biology, chemistry, physics and math, followed by cell biology, biochemistry, and genetics. To achieve this, students enroll in courses across the Faculty of Science and the Cumming School of Medicine. For the Bioinformatics major, students are engaged deeply in both computing science and biology, with added emphasis in mathematics, statistics and genetics/genomics, also relying on coursework offered by the Faculty of Science and the Cumming School of Medicine. For the Health and Society major, students select an area of concentration from among the social sciences (anthropology, community rehabilitation and disability studies, economics, political science, psychology, sociology), taking coursework from the Faculty of Arts and Cumming School of Medicine. This is complemented by a suite of Health and Society courses focused on public health, social determinants of health and health inequity.

Experiential Learning and Integration of Research: There is significant emphasis on experiential learning and the integration of research in the Bachelor of Health Sciences program. Research skills are integrated into every year of the program curricula, beginning with the first inquiry-based course offered in the program and culminating with the capstone honours research project. Curriculum-based integration of experiential learning and research is complemented by a robust summer studentship program that funds BHSc students to immerse themselves in authentic research environments across the University of Calgary and beyond.

Internationalization: The BHSc program attracts a limited number of international students, including a cohort of students from Kuwait who study in the BHSc program prior to completing MD studies at the University of Calgary. International experiences are also offered to students in the summer through our Global Health Program (including Tanzania, Ethiopia, Nicaragua, Dominican Republic) and our affiliation with both Harbin Medical University and Sun Yat-Sen University in the People's Republic of China. Although term-abroad programs are challenging to schedule for BHSc students, past students have participated in summer term international programs or have conducted independent research with a faculty member at an international institution. Both of these are facilitated with transfer credit or summer studentship support.

Minors: The BHSc program offers two minors – one in Health and Society and one in Bioinformatics. The Health and Society minor is available both to students in other majors of the BHSc program as well as to students enrolled in other programs of study at the University of Calgary. The minor in Bioinformatics is available to a more limited pool of students and includes those in the Biomedical Sciences and Health and Society majors of the BHSc program, students in program of study in Biological Sciences, and students in Computing Science.

Special Features of the Program: The BHSc program has a number of unique features, which complement the academic work in the program. These include a robust summer studentship program, mentorship program, buddy program and global health program. The summer studentship program funds a minimum of **fifty** summer studentship awards for BHSc students undertaking summer research with faculty members across the University of Calgary. This is a significant investment and compares very favorably with other programs across the country, such as the Bachelor of Health Sciences program at McMaster University in which only two paid summer studentships are available annually. The mentorship program pairs BHSc students with a faculty mentor. The buddy program pairs incoming BHSc students with a more senior BHSc student. We are further expanding student engagement initiatives and have recently hired a dedicated program engagement specialist.

Curriculum Review Process

This report reflects a curriculum review that began in 2017 and which has undergone subsequent iterative steps of reflection and revision to produce this final report. The initial curriculum review was conducted by the Directors' Team of the Bachelor of Health Sciences Program, under the leadership of the Associate Dean (Undergraduate Health and Science Education)/Director of the Bachelor of Health Sciences program. This included consultation with review experts in the Taylor Institute for Teaching and Learning. The curriculum review captured student perceptions through both student survey data and data from the National Survey on Student Engagement (2017).

The BHSc program has articulated eight program-level learning outcomes that fall broadly into the following headings:

1. Critical Thinking Skills
2. Oral Communication Skills
3. Written Communication Skills
4. Research Skills
5. Scholarly and Disciplinary Literacy
6. Collaboration
7. Foundational Knowledge and Perspectives
8. Application of Foundational Knowledge and Perspectives

Four guiding questions were developed to reflect on assessment strategies, student engagement, as well as strengths and gaps in the curriculum. The analysis of curriculum mapping and external survey data led to several major findings:

Analysis of our curriculum maps and consideration of the student perspective led to several findings:

1. The BHSc program, across all three majors and the inquiry courses, has a very strong curriculum that aligns well and deeply with the program-level learning outcomes. No major gaps or redundancies were identified through this review.
2. Assessment strategies across the program provide students with feedback related to all program-level learning outcomes and at the full spectrum of learning levels – from introductory to advanced. The strategies employed include assessments of individual work, as well as assessment of group work in keeping with the focus on collaboration in these courses, although the latter is less frequently assessed. Assessments are focused on higher-order learning outcomes, which include application, analysis, synthesis and evaluation, as well as the creation of new knowledge. This is particularly pronounced in the senior level courses when students are engaged in independent and open inquiry, such as practicum research projects and their thesis projects.
3. Student engagement, as measured by the National Survey on Student Engagement, is high. Students across all majors and years reflect positively on the small class sizes, interdisciplinary focus, opportunities for skill development (teamwork, research), opportunities to engage meaningfully with faculty, funded summer research opportunities, and mentorship and student support programs.

Reflecting on our curriculum review also brought to light several opportunities, which form the scaffold of our five-year action plan. Among these are:

1. Explicit integration of precision medicine/precision public health content into current MDSC and HSOC courses, and development of a stand-alone course in precision medicine
2. Integration of Indigenous health content into our second-year inquiry course, with additional depth integrated into HSOC courses
3. Examination of the suitability of/requirement for current foundation courses to support student learning and increase program flexibility
4. Examination of the Bioinformatics curriculum with a view to streamlining program requirements to enhance focus on Bioinformatics
5. Evaluation of opportunities to enhance interdisciplinary integration across majors in Year 3
6. Expanded offerings of academically-supportive, community outreach and social events to further enhance the student experience

The curriculum review process has demonstrated that the Cumming School of Medicine has an exceptionally strong BHSc program. The program has clearly articulated program-level learning outcomes and curricula that map well to them. This reflects the continuous consideration of curriculum that takes place within the program, and which has taken place since the program's inception. However, this process has brought to light new areas upon which to focus in the coming years. Efforts in these areas will be carefully monitored and new coursework will be developed with the curriculum map in mind.

Action Plan

Short-term: One year or less
Medium-term: Two to three years
Long-term: Four to five years

Recommendation: ***Curriculum***	**Action Items**	**Timeline for Implementation**	**Lead Responsibility**
	Development of a precision medicine course	long term	BHSc Director Team
	Explicit integration of precision medicine/precision public health content into current MDSC/HSOC courses	medium term	BHSc Director Team
	Integration of Indigenous health content across BHSc courses	medium term	BHSc Director Team
	Examine the suitability of/requirement for current foundation courses to support student learning and to increase program flexibility	short-medium term	BHSc Director Team
	Revisit structure/density of BINF curriculum. Consider creation of customized foundation coursework in stats/computing science within the program.	short term (examining curriculum) medium term (new course development/calendar changes	Dave Anderson
	Evaluate opportunities for enhanced interdisciplinary integration across majors in Year 3 of program	medium term	BHSc Director Team

Recommendation: ***Administrative***	**Action Items**	**Timeline for Implementation**	**Lead Responsibility**
	Hire a Student Engagement Coordinator	complete	Ebba Kurz
	Hire a new BINF instructor	complete	Ebba Kurz/Jonathan Lytton

	Conduct an environmental scan of health sciences programs across Canada	short-medium term	Ebba Kurz
	Develop a strategic plan	medium term	Ebba Kurz

Recommendation: *Faculty/ Professional Learning Development*	**Action Items**	**Timeline for Implementation**	**Lead Responsibility**
	Identify and support BHSc faculty for University-wide teaching awards	ongoing	BHSc Director Team

Recommendation: Other	**Action Items**	**Timeline for Implementation**	**Lead Responsibility**
	Form a BHSc engagement committee (BEC) with representation from BHSc program and student body	complete	Ebba Kurz/ Tharwat Skeik
	Organize and schedule events through BEC to support students within and beyond the classroom.	ongoing	Tharwat Skeik
	Host annual BHSc town halls to engage students in program initiatives and to receive student feedback.	ongoing	Ebba Kurz/ Tharwat Skeik
	Evaluate student engagement (and identify areas of student need/concern) through survey and focus group discussions	ongoing	Tharwat Skeik

Communication Plan

We intend to take a multi-pronged approach to communicate the findings of this curriculum review with our stakeholders. The findings and action plan will be shared with core BHSc faculty members (those teaching/coordinating MDSC and HSOC courses) through a course coordinators meeting, similar to that currently held annually to discuss academic regulations, fostering of academic integrity and the like. We intend to share the high-level findings of this review with students through a BHSc town hall. Progress on our action plan will be reviewed and discussed by the Associate Dean (Undergraduate Health and Science Education) with the BHSc Directors/Co-Directors during their monthly Directors' Meetings. Finally, a presentation summarizing the curriculum review process and findings will be made to the CSM Senior Education Committee.

Conclusion

The curriculum review process has demonstrated that the Cumming School of Medicine has an exceptionally strong BHSc program. The program has clearly articulated program-level learning outcomes and curricula that map well to them. This reflects the continuous consideration of curriculum that takes place within the program, and which has taken place since the program's inception. However, this process has brought to light new areas upon which to focus in the coming years. Efforts in these areas will be carefully monitored and new coursework will be developed with the curriculum map in mind.