### Human Biology – Health & Disease

#### 2 Major Program Modifications (Significant Alterations to Existing Program Component)

##### Health & Disease Major

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**HMB: Health & Disease**

The objective of the HMB: Health & Disease program is to provide students with a solid foundation in the biological sciences as it relates to basic human physiology and the mechanisms of disease and to facilitate the integration of concepts from across the life sciences, social sciences and humanities. In addition, students will acquire skills in laboratory science, experience with quantitative approaches, and develop effective communication skills to provide an appropriate background essential to research and problem solving in this field.

##### Current Admission Requirements:

No changes

##### New Admission Requirements:

No changes

##### Current Enrolment Requirements:

This is a Type 1 open enrolment program. Students are permitted to enrol in the major during the program enrolment cycle as soon as they have earned 4.0 FCE. It is recommended students complete their first year life science requirements before entering the major.

##### New Enrolment Requirements:

This major is a Type 1 open enrolment program. Students are permitted to enrol in the major during the program enrolment cycle as soon as they have earned 4.0 FCE. It is recommended students complete the programs required 100-level courses before entering the major program.

##### Current Completion Requirements:

**Required Courses (8.0 FCE)**

1. BIO120H1, BIO130H1  
2. (CHM135H1, CHM136H1)/(CHM138H1, CHM139H1)/CHM151Y1 *(transfer credits will be accepted in lieu of the chemistry requirements only if they carry a direct exclusion to a pre-approved chemistry course)*  
3. MAT135H1/ PHY131H1/ PHY151H1  
4. HMB202H1  
5. BIO230H1/ BIO255H1, BIO220H1  
6. HMB265H1/BIO260H1
7. BCH210H1

Year 3: Selected topics in health and disease with greater depth and self-directed learning

8. PSL300H1, PSL301H1

9. HMB302H1

10. 0.5 FCE from courses that focus on the social, economic, political and/or biological perspectives of health and disease: HMB303H1/ HMB306H1/ HMB325H1/ANT208H1/ CSB351Y1/ IMM340H1/ IMM350H1/HST209H1/ HST211H1/ HST408H1/ HST440H1/ JSU237H1/ JNH350H1/ SOC309Y1/ SOC363H1/STA220H1/ PSY201H1/UNI103Y1/ WGS367H

Year 4: Advanced topics in health and disease that emphasize primary research and critical analysis

11. 0.5 FCE from depth courses in health and disease:
HMB312H1/HMB314H1/HMB322H1/ HMB323H1/ HMB342H1/ HMB360H1/ ANA300Y1/ ANA301H1/ BIO270H1/ BIO271H1/ BCH311H1/ BCH340H1/ CJH332H1/ CJS325H1/ CJS327H1/ CSB328H1/ CSB343H1/ CSB345H1/ CSB346H1/ EEB318H1/ EEB319H1/ EEB323H1/ EEB325H1/ EEB362H1/ EEB375H1/ EJH352H1/ LMP301H1/ LMP363H1/ NFS384H1/ NFS386H1/ PCL201H1/ PCL302H1/ PCL362H1/ PSL304H1/ PSL305H1/ PSY342H1/ PSY371H1/ PSY372H1/ PSY397H1

12. 0.5 FCE from courses with advanced, research-driven, and translational and critical analysis:

n.b. At least 0.5 FCE must be at the 400-level; students are not permitted to be enrolled in more than one Human Biology major program

New Completion Requirements:

Required Courses (8.0 FCE, including at least 0.5 FCE at the 400-level)

Chemical and Physical Foundations of Biological Systems
1. (CHM135H1, CHM136H1)/ (CHM138H1, CHM139H1)/CHM151Y1 Transfer credits will be accepted in lieu of the chemistry requirements only if they carry a direct exclusion or equivalency to a pre-approved chemistry course
2. MAT135H1/ PHY131H1/ PHY151H1
3. BCH210H1

Biological Foundations of Living Systems
4. BIO120H1, BIO130H1
5. BIO220H1
6. BIO230H1/ BIO255H1
7. HMB265H1/ BIO260H1
8. PSL300H1, PSL301H1

Health & Disease Concentration Courses
9. HMB202H1
10. HMB302H1/HMB322H1

11. 0.5 FCE from: HAJ453H1/ HMB401H1/ HMB402H1/ HMB422H1/ HMB432H1/ HMB436H1/ HMB437H1/ HMB440H1/ HMB441H1/ HMB443H1/ HMB452H1/ HMB462H1/ HMB470H1/ HMB471H1/ HMB472H1/ HMB473H1/ HMB474H1/ EJH352H1/ JEH455H1/ ANA300Y1/ ANA301H1/ CSB345H1/ EEB325H1/ LMP301H1/
Data Analysis and Research-Based Courses

12. 0.5 FCE in statistics: HMB325H1/ STA220H1/ STA288H1/ PSY201H1

13. 0.5 FCE from an upper-year lab or research-based course: HMB312H1/ HMB314H1/ HMB323H1/ HMB342H1/ HST373H1/ HMB496Y1*/ HMB499Y1*

*A research project from a different unit may be accepted with prior written approval from Human Biology if the course is not counting toward a different program.

Health & Disease Major Notes:

1. Courses can only count toward one requirement, even if listed as options to multiple requisites of the program

2. Not all courses listed have priority enrolment for Health & Disease majors. Students are responsible for checking priority of courses and meeting course prerequisites for courses they wish to take.

3. The Health & Disease major cannot be paired with any other Human Biology Program managed major program.

Academic Context:

Health and disease encompass the field of studies focused on health systems in the human body and disease systems affecting humans. The Health & Disease program in the Faculty of Arts & Science exists to provide students with a firm foundation in both systems through courses offered through the collaborative program in Human Biology and other courses offered within the Faculty of Arts & Science.

In 2015, the Health & Disease major program was revised to emphasize fundamental concepts in health and disease and how these concepts have impacted society. The program takes an interdisciplinary approach to the study of health and disease, ranging from human genetics and the mechanisms of disease to nutrition, exercise, and the social determinants of health. The intent of the program was to provide students with a broad foundation in the study of health of disease through courses in HMB as well as courses that are offered through other departments and programs.

The current proposal is a further revision of the program re-orientation that was initiated in 2015. The proposed program is designed to provide students with a firm foundation health and disease sciences through courses in HMB as well as courses offered throughout the Faculty of Arts & Science.

Students graduating with a major from the Health & Disease program will be able to communicate effectively with the public, NGOs, private sector, and government on the basic principles of health and disease and issues surrounding its societal implications. Students will also be able to specialize by pursuing health and disease research through graduate studies, further training as health care professionals, or pursuing advanced degrees in social work, public policy, business, or law.

Learning Outcomes:

Students enter the program at the end of their first year after establishing a foundation in organic biology and chemistry as well as physical chemistry. Students will build on this foundation with foundation courses (HMB202H1, HMB265H1, BIO230H1, BCH210H1, PSL300H1, and PSL301H1) that are designed to provide a broad overview of their respective subject areas, all of which supply the foundation to the study of health and disease systems. Students will also learn quantitative analysis skills in a statistics course, which will become immediately applied to a higher-year lab course or research based course in which students will learn lab skills and/or research skills relevant to further studies in health and disease and cellular molecular biology.

As students progress through their studies, they will take a series of core Health & Disease concentration courses that will cover a wide range of topics relevant to studies in health and disease including: histology (HMB302H1) topics related to health systems (HMB322H1), and higher-year course of the students choosing relating to health systems and/or disease systems (all of which have heavy critical analysis components surrounding current primary research and feature assessments such as grant proposals and literature reviews). These courses focus on particular aspects to health and disease and build on knowledge gains in foundation courses and work to present to students a comprehensive analysis of human health systems and disease systems.

Specific learning outcomes remain the same as proposed in 2015:

1. Demonstrate an understanding of the fundamental concepts in human health and disease and how these concepts are applied.
2. Identify, analyze and critically evaluate data from health and disease research from the primary literature.
3. Understand and apply appropriate quantitative techniques needed to examine health and disease related data.
4. Identify and critically evaluate contemporary sociological and ethical perspectives on health and disease research.
5. Write and speak effectively about health and disease issues to both scientific and broader audiences.
Our objectives and outcomes remain consistent with the 2015 major program modifications, but now that HMB has its own lab space, increased staff support, and wishes to acknowledge the changes in the study of health sciences and disease systems, the required courses have been adjusted to reflect our desired outcomes and objectives, and to offer a more consistent foundation to all students in the program.

**Depth of Knowledge:**

Introductory courses are designed to expose students to fundamental concepts in genetics (HMB265H1/BIO260H1), health and disease (HMB202H1), as well as biochemistry (BCH210H1) and molecular biology (BIO230H1/BIO255H1). These courses provide a core knowledge base in these areas from which students will build. Students are then introduced to more advanced health and disease courses that highlight anatomy and physiology (ANA300Y1, PSL300H1, PSL301H1), histology (HMB302H1), and the immune system (IMM350H1). Further depth in these subjects is available in courses that focus on epidemiology (HMB342H1), or principles of pathobiology (LMP363H1). Students can further engage in specialized courses in the genetics of human disease (HMB441H1), and advanced nutrition (NFS484H1).

**Critical and Creative Thinking:**

Students engage in critical thinking early on in the program. For example, in HMB265H1 and HMB202H1 there are assignments and tests that focus on the application of course concepts and information through problem-based learning, whereas written assignments and oral presentations are based on the synthesis and critical analysis of information and techniques from both primary and review articles. As with all life science programs, the integration of primary research findings into all of our courses, but especially in 300- and 400-level courses, is a critical component of the student learning experience. Students are taught how to interpret and critically analyze research as well as develop the skills in synthesizing information from multiple sources. The program also uses creative ways to facilitate reflective thinking. For example, HMB443H1 integrates community engaged learning as a primary method for teaching students about micronutrient deficiencies and food security.

**Information Literacy:**

Students learn effective written and oral strategies for communicating their analyses and critiques. For example, seminar courses often require students to be creative and persuasive in developing research grant proposals in translational medicine (HMB402H1). Team-based learning and peer evaluations, either in class or online, are also integrated in several different courses, such as HMB302H1 where students work in pairs or small groups where students engage in peer learning and evaluation. Seminar presentations or poster presentations are common among most advanced courses and this enables students to develop key skills in explaining, discussing, critically analyzing and synthesizing research findings in an oral presentation format. Students also have opportunities to cultivate an ability to interact and debate issues in a group setting with guest speakers that are experts in their fields, preparing them with communication skills that will be useful in a professional workplace.

In order to complete written and oral assignments, students are required to learn to use Internet based search engines (e.g. PubMed, Google Scholar, Ensembl, Allen Brain Atlas, etc.) to acquire relevant information from the primary literature, and genome and gene expression databases. In HMB302H1, students engage in peer teaching and evaluation facilitated by social media and access to an online image database. Students are typically evaluated on their effective gathering and use of this information through enhanced citations, and the ability to use PowerPoint, Keynote, blogs and other presentation formats.

**Quantitative Reasoning:**

While many courses will integrate quantitative analysis and reasoning, such as genetic mapping (HMB265H1), or statistically analyzing altered physical parameters due to exercise (HMB471H1), the program also requires that students take basic statistics courses (HMB325H1/STA220H1/STA288H1/PSY201H1) that will serve as a foundation for understanding concepts and analyzing research in other courses.

**Social and Ethical Responsibility:**

Several courses will introduce students to some of the bioethical, social and health policy issues and controversies surrounding specific topics in health and disease, such as AIDS (HAJ453H1), and dementia (HMB440H1). The overall objective is to challenge students to think about the benefits of health and disease research, and the limits of these benefits, on society, including medicine, law and biotechnology.

An Integrative, Inquiry Based Activity:
Seminar courses at the 400-level provide a major opportunity for students to integrate knowledge from across a spectrum of health and disease related courses. Students in the major program are encouraged to complete a full-year research project course or a summer research project course (HMB496Y1/HMB499Y1), although this is not a requirement. Students will typically identify suitable supervisors in hospital research institutes or campus-based laboratories and research groups. Research project course oversight includes a HMB faculty advisor facilitates the placements, guide workshops on research presentation skills or apply statistical analyses (in collaboration with Department of Statistical Sciences), as well as organize research presentation days (with research faculty to serving as assessors). Students gain invaluable first-hand experience integrating their knowledge of health and disease and other related subjects, learn to apply their quantitative reasoning and analytical skills, practice effective communication and team-based learning, and learn about ethical standards in research.

### Program Delivery:

**Method:** In Class; Online  
**Mode:** Full Time; Part Time

### Brief Description of the Proposal:

Modification of how the Calendar listing is organized for better clarity of program requirements and the purpose of each requirement. The total FCE count has remained the same. Courses allowed for the program at the higher levels have been reviewed and revised to better reflect courses that directly relate to the study of health and disease.

### Details of Proposed Change:

Students now have the option to take either HMB302H1 or HMB322H1 (change to requisite line that required only HMB302H1) allowing more program flexibility.

A lab or research based course is now required (0.5 FCE from an upper-year lab or research-based course: HMB312H1/ HMB314H1/ HMB323H1/ HMB342H1/ HST373H1/ HMB496Y1/ HMB499Y1) to better ensure all students meet the learning outcomes as outlined in the 2015 major modification proposal and echoed in this proposal.

A statistics course is now required (0.5 FCE in statistics: HMB325H1/ STA220H1/ STA288H1/ PSY201H1) to better ensure all students meet the learning outcomes as outlined in the 2015 major modification proposal and echoed in this proposal.

### Rationale:

The Human Biology Program completed a self-study in March 2014 that the program and the Faculty of Arts & Science has been steadily working on the recommendations to enhance the overall quality of the program. Many of the recommendations have already been put into effect: our smallest program (Health Care Ethics major) has been closed for further admissions and a proposal to formally close the program will be put forward in October 2017, we have signed a MOA giving the School of the Environment full ownership of the Environment and Health major and specialist (ASMAJ0365 and ASSPE0365) and have agreed to continue teaching and supporting the capstone requirement course for the specialist program: JEH455H1 (Topics in Environment & Health) and giving Environment and Health students enrolment priority in a number of our courses.

One of the first acts was a revision of the Health & Disease (ASMAJ2013 & ASSPE2013), Neuroscience (ASMAJ1472 and ASSPE1472), and our then- Genes, Genetics, and Biotechnology, now Fundamental Genetics and its Applications program (ASMAJ1050 and ASSPE1050), and Human Biology (ASMAJ2035) programs to better align the programs with the teaching strengths of the unit, the resources of the unit, and the course offerings within the Faculty of Arts & Science. These modifications came into effect in 2015-2016.

This realignment of four of our five programs has benefited the program as a whole and our students greatly, and have allowed us to see more clearly where there are gaps in the program structure and program objectives, as well as allowing us to see how to better align the programs with their objectives, as outlined in 2015.

Since then, we have consulted with the Dalla Lana School of Public Health on pedagogy revisions for our Global Health major and Specialist (ASMAJ25757 and ASSPE2575), and have consulted with our faculty and staff to better assess pedagogy gaps and inconsistencies in program structure and pressure points within our programs in terms of enrollment and student outcomes. Many of the gaps/misalignment were due to lack of lab space, staff, support, or lack of faculty to teach core courses.

Even in the 2015 major modification proposal, it was outlined that HMB has been working closely with [the Cell Systems and Biology Department], [the Department of Ecology and Evolutionary Biology] and the [Faculty of Arts & Science] to expand and modernize lab course offerings in the planned renovations of the [Ramsay Wright] teaching labs. However, at the time of the proposal, the labs were not yet constructed. Construction began in spring 2015 and they are currently nearing completion. HMB teaching labs will be ready for full-time use by September 2017. As such,
we wish to utilize these labs in our HMB courses to better meet listed course objectives for the benefit of our students. Since many of the recommendations from the external review have been met, and now that HMB has more staff support including 2 lab technicians, a more clear vision, our own teaching labs (which will allow us to use the space more frequently), and have been approved to hire an appointed faculty member starting in July 2017 (the search is currently ongoing) who will allow us to offer more course sections of some of our courses without overburdening teaching assignments, we would like to make further revisions to better meet objectives outlined in 2014. The proposed restructuring of all of our programs is the next step in further defining improvements and innovations first initiated in 2015-2016.

Impact that the proposal may have on students or other academic units/divisions:

Impact on other units should be minimal as enrolment is not planned to increase. The majority of the courses required in the program are the same course requirement/requirement options as the current neuroscience major. Impact on our unit should also not increase as we have increased staff support.

There is currently 765 students enrolled in the Health & Disease major program with a two year annual average enrolment of 806. We do not anticipate this number fluctuating up or down based on enrolment trends in all of our programs over the last few years.

Consultation:

Director Dr. Melanie Woodin has consulted extensively with Vice-Deans Pamela Klassen and Poppy Lockwood as well as with faculty within the Human Biology program.

After consultations with Biochemistry in January 2017, we have eliminated the option to use CHM247H1 in lieu of BCH210H1.

The following consultations were due to feedback from the Life Science Planning Meeting in January 2017: After consultations with EEB in January 2017, EHJ352H1 has been added as a course option for higher year Health & Disease concentration courses. BIO220H1 is now included in the admissions criteria for students applying with 8.0 or more FCE complete. After consultations with Pathobiology in January 2017, LMP365H1 has been removed as a course option for higher year Health & Disease concentration courses, and replaced with LMP363H1.

Diversity:

The re-design of the Health & Disease program ensures all students receive a solid foundation in both health systems and disease systems in the human body. HMB works closely with Accessibility Services, and accommodations requested are met. This will not change. Further, many of our faculty work to offer a variety of assignments that better provide to a variety of learners in their courses.

Resource Implications:

Current support is adequate.

Faculty and TA Support:

Current support is adequate.

Health & Disease Specialist

Start Session:

Summer 2017

Current Calendar Description:

New Calendar Description:

HMB: Health & Disease

The objective of the HMB: Health & Disease program is to provide students with a solid foundation in the biological sciences as it relates to basic human physiology and the mechanisms of disease and to facilitate the integration of concepts from across the life sciences, social sciences and humanities. In addition, students will acquire skills in laboratory science, experience with quantitative approaches, and develop effective communication skills to provide an appropriate background essential to research and problem solving in this field.
Current Admission Requirements:

New Admission Requirements:

No changes

Current Enrolment Requirements:

This is a Type 3 limited enrolment program. Meeting the following minimum criteria does not guarantee admissions to the specialist program:

- BIO120H1 with a minimum mark of 60%
- BIO130H1 with a minimum mark of 60%
- CHM135H1 and CHM136H1 or CHM138H1 and CHM139H1 or CHM151Y1 with a minimum mark of 60%
- MAT135H1 or PHY131H1 or PHY151H1 with a minimum mark of 60%

and, a composite average of at least 70% on the above 2.5 FCE.

Students may apply for this program only during Round 1 of Type 3 Enrolment. Students applying for admissions to the program utilising transfer credits or later than the end of their first year will be considered on a case-by-case basis.

For more information about Type 3 enrolment, visit the Faculty of Arts & Science Program Enrolment Instructions website.

New Enrolment Requirements:

This specialist is a Type 3 limited enrolment program. Admissions will be based on the following criteria, however achieving the minimum marks listed does not guarantee admission to the Health & Disease specialist in any given year.

Applying with less than 8 FCEs:

- Completion of BIO130H1 with a minimum grade of 65
- Completion of CHM135H1 and CHM136H1 OR completion of CHM151Y1
  - Transfer credits will be accepted in lieu of the chemistry requirements only if they carry a direct exclusion or equivalency to a pre-approved chemistry course. Please carefully check your Transfer Credit Assessments.
- Completion of 4.0 FCE

Applying with 8 or more FCEs completed:

- Completion of BIO230H1/ BIO255H1 with a minimum grade of 65
- Completion of BIO220H1
- Completion of HMB265H1/ BIO260H1
- Completion of BCH210H1

Students may apply for this major program during Round 1 and Round 2 of Type 3 Enrolment after they have earned 4.0 FCE. Students applying for admissions to the program utilizing transfer credits will be considered on a case-by-case basis. Students entering from CEGEP or from another university should contact hmb.undergrad@utoronto.ca after their transfer credit assessment has been complete for program enrolment assessment. For more information about Type 3 enrolment, visit the Faculty of Arts & Science Subject Program Enrolment Instructions website.

Current Completion Requirements:

Required Courses (13.5 FCE)

Prior to entering POST:

1. BIO120H1, BIO130H1
2. (CHM135H1, CHM136H1)/(CHM138H1, CHM139H1)/CHM151Y1 (transfer credits will be accepted in lieu of the
chemistry requirements only if they carry a direct exclusion to a pre-approved chemistry course)

3. MAT135H1/PHY131H1/PHY151H1

Year 2: Foundations in health and disease

4. HMB202H1
5. (BIO230H1/BIO255H1), BIO220H1
6. HMB265H1/BIO260H1
7. BCH210H1
8. statistics: STA220H1/PSY201H1/HMB325H1
9. bioethics: PHL281H1/HMB306H1

Year 3: Selected Topics in health and disease with greater depth and self-directed learning

10. HMB302H1

11. 1.0 FCE from depth courses on the molecular biology of cells and tissues: CSB327H1/CSB328H1/CSB331H1/BCH311H1/CSB349H1/PSL350H1

12. PSL300H1, PSL301H1

13. 1.0 FCE from further courses that focus on the structure and function of the human body: ANA300Y1/IMM340H1/IMM350H1/MGY377H1/MGY378H1/CSB351Y1

14. 0.5 FCE from courses that will enable the development of skills in laboratory science: HMB312H1/CSB330H1/PSL372H1/BCH370H1

Year 4: Advanced topics in health and disease with emphasis on primary research and critical analysis

15. 0.5 FCE from depth courses in health and disease: HMB321H1/HMB322H1/HMB323H1/HMB342H1/HMB360H1/ANA300Y1/ANA301H1/BIO270H1/BIO271H1/BCH311H1/BCH340H1/CJH332H1/CSB325H1/CSB327H1/CSB328H1/CSB343H1/CSB345H1/CSB346H1/EEB318H1/EEB319H1/EEB323H1/EEB325H1/EEB362H1/EEB375H1/EJB352H1/LMP301H1/LMP363H1/NFS284H1/NFS382H1/NFS386H1/PCL201H1/PCL302H1/PCL362H1/PSL304H1/PSL305H1/PSY342H1/PSY371H1/PSY372H1/PSY397H1

16. 1.0 FCE from courses that focus on the social, economic and political perspectives of health and disease: HMB303H1/HMB306H1/HMB325H1/ANT208H1/HST209H1/HST211H1/HST408H1/HST440H1/JSU237H1/JNH350H1/NEW335H1/NFS284H1/PHL281H1/PSY201H1/SOC243H1/SOC244H1/SOC246H1/SOC309Y1/SOC363H1/STA220H1/UNI103Y1/WGS367H1


18. HMB499Y1

n.b. At least 1.0 FCE must be at the 400-level

New Completion Requirements:

Required Courses (13.0 FCE, including at least 1.0 FCE at the 400-level)

Chemical and Physical Foundations of Biological Systems
1. (CHM135H1, CHM136H1)/(CHM138H1, CHM139H1)/CHM151Y1 Transfer credits will be accepted in lieu of the chemistry requirements only if they carry a direct exclusion or equivalency to a pre-approved chemistry course
2. MAT135H1/ PHY131H1/ PHY151H1
3. BCH210H1

**Biological Foundations of Living Systems**

4. BIO120H1, BIO130H1
5. BIO220H1
6. BIO230H1/ BIO255H1
7. HMB265H1/ BIO260H1
8. PSL300H1, PSL301H1
9. 1.0 FCE from depth courses on the molecular biology of cells and tissues: CSB327H1/ CSB328H1/ CSB331H1, (BCH311H1/ CSB349H1/ PSL350H1)

**Health & Disease Concentration Courses**

10. HMB202H1
11. HMB302H1
12. HMB322H1
13. 2.0 FCE from: HAJ453H1/ HMB401H1/ HMB402H1/ HMB422H1/ HMB432H1/ HMB434H1/ HMB436H1/ HMB437H1/ HMB440H1/ HMB441H1/ HMB443H1/ HMB452H1/ HMB462H1/ HMB470H1/ HMB471H1/ HMB472H1/ HMB473H1/ HMB474H1/ JEH455H1/ ANA300Y1/ ANA301H1/ CSB345H1/ CSB351Y1/ EEB325H1/ IMM340H1/ IMM350H1/ LMP301H1/ LMP365H1/ LMP403H1/ LMP406H1/ MGY377H1/ MGY378H1/ NFS485H1/ NFS486H1/ PCL362H1/ PSL404H1/ PSL421H1/ PSL425H1

**Data Analysis and Research-Based Courses**

14. 0.5 FCE in statistics: HMB325H1/ STA220H1/ STA288H1/ PSY201H1
15. 0.5 FCE in bioethics: HMB306H1/ HMB406H1/ PHL281H1
16. 0.5 FCE from upper-year lab course: HMB312H1/ HMB314H1/ CSB330H1/ PSL372H1/ BCH370H1
17. 0.5 FCE from research based courses: HMB323H1/ HMB342H1/ HST373H1
18. 1.0 FCE from HMB496Y1*/ HMB499Y1*

*A research project from a different unit may be accepted with prior written approval from Human Biology if the course is not counting toward a different program.

**Health & Disease Specialists Notes:**

1. Courses can only count toward one requirement, even if listed as options to multiple requisites of the program
2. Not all courses listed have priority enrolment for Health & Disease specialists. Students are responsible for checking priority of courses and meeting course prerequisites for courses they wish to take.

**Academic Context:**

Health and disease encompass the field of studies focused on health systems in the human body and disease systems affecting humans. The Health & Disease program in the Faculty of Arts & Science exists to provide students with a firm foundation in both systems through courses offered through the collaborative program in Human Biology and other courses offered within the Faculty of Arts & Science.

In 2015, the Health & Disease specialist program was revised to emphasize fundamental concepts in health and disease and how these concepts have impacted society. The program takes an interdisciplinary approach to the study of health and disease, ranging from human genetics and the mechanisms of disease to nutrition, exercise, and the social determinants of health. The intent of the program was to provide students with a broad foundation in the study of health and disease through courses in HMB as well as courses that are offered through other departments and programs.

The current proposal is a further revision of the program re-orientation that was initiated in 2015. The proposed program is designed to provide students with a firm foundation health and disease sciences through courses in HMB as well as courses offered throughout the Faculty of Arts & Science.

Students graduating with a specialist in the Health & Disease program will be able to communicate effectively with the public, NGOs, private sector, and government on the basic principles of health and disease and issues surrounding its societal implications. Students will also be able to specialize by pursuing health and disease research through graduate studies, further training as health care professionals, or pursuing advanced degrees in social work, public...
Learning Outcomes:

Students enter the program at the end of their first year after establishing a foundation in organic biology and chemistry as well as physical chemistry. Students will build on this foundation with foundational courses (HMB202H1, HMB265H1, BIO230H1, BCH210H1, PSL300H1, and PSL301H1) that are designed to provide a broad overview of their respective subject areas, all of which supply the foundation to the study of health and disease systems. Students will also learn quantitative analysis skills in a statistics course, which will become immediately applied to a higher-year lab course or research based course in which students will learn lab skills and/or research skills relevant to further studies in health and disease and cellular molecular biology.

As students progress through their studies, they will take a series of core Health & Disease concentration courses that will cover a wide range of topics relevant to studies in health and disease including: histology (HMB322H1), and higher-year course of the students choosing relating to health systems and/or disease systems (all of which have heavy critical analysis components surrounding current primary research and feature assessments such as grant proposals and literature reviews). These courses focus on particular aspects to health and disease and build on knowledge gains in foundation courses and work to present to students a comprehensive analysis of human health systems and disease systems.

Specific learning outcomes of the program remain as proposed in 2015:

By the end of this program, students will be able to:
1. Demonstrate an understanding of the fundamental concepts in human health and disease and how these concepts are applied.
2. Identify, analyze, and critically evaluate data from health and disease research from the primary literature.
3. Acquire important lab skills in the life sciences.
4. Understand and apply appropriate quantitative techniques needed to examine health and disease related data.
5. Identify and critically evaluate ethical perspectives on health and disease research.
6. Gain research experience in health and disease through the collection, analysis and interpretation of scientific data.
7. Write and speak effectively about health and disease issues to both scientific and broader audiences.

Depth of Knowledge:

Introductory courses are designed to expose students to fundamental concepts in genetics (HMB265H1/BIO260H1), health and disease (HMB202H1), as well as biochemistry (BCH210H1) and molecular biology (BIO230H1/BIO255H1). These courses provide a core knowledge base in these areas from which students will build. Students are then introduced to more advanced health and disease courses that highlight anatomy and physiology (ANA300Y1, PSL300H1, PSL301H1), histology (HMB302H1), and the immune system (IMM350H1). Further depth in these subjects is available in courses that focus on epidemiology (HMB342H1), or principles of pathobiology (LMP363H1). Students can further engage in specialized courses in the genetics of human disease (HMB441H1), and advanced nutrition (NFS484H1).

Critical and Creative Thinking:

Students engage in critical thinking early on in the program. For example, in HMB265H1 and HMB202H1 there are assignments and tests that focus on the application of course concepts and information through problem-based learning, whereas written assignments and oral presentations are based on the synthesis and critical analysis of information and techniques from both primary and review articles. As with all life science programs, the integration of primary research findings into all of our courses, but especially in 300- and 400-level courses, is a critical component of the student learning experience. Students are taught how to interpret and critically analyze research as well as develop the skills in synthesizing information from multiple sources. The program also uses creative ways to facilitate reflective thinking. For example, HMB443H1 integrates community engaged learning as a primary method for teaching students about micronutrient deficiencies and food security.

Information Literacy:

Students learn effective written and oral strategies for communicating their analyses and critiques. For example,
seminar courses often require students to be creative and persuasive in developing research grant proposals in translational medicine (HMB402H1). Team-based learning and peer evaluations, either in class or online, are also integrated in several different courses, such as HMB302H1 where students work in pairs or small groups where students engage in peer learning and evaluation. Seminar presentations or poster presentations are common among most advanced courses and this enables students to develop key skills in explaining, discussing, critically analyzing and synthesizing research findings in an oral presentation format. Students also have opportunities to cultivate an ability to interact and debate issues in a group setting with guest speakers that are experts in their fields, preparing them with communication skills that will be useful in a professional workplace.

In order to complete written and oral assignments, students are required to learn to use Internet based search engines (e.g. PubMed, Google Scholar, Ensembl, Allen Brain Atlas, etc.) to acquire relevant information from the primary literature, and genome and gene expression databases. In HMB302H1, students engage in peer teaching and evaluation facilitated by social media and access to an online image database. Students are typically evaluated on their effective gathering and use of this information through enhanced citations, and the ability to use PowerPoint, Keynote, blogs and other presentation formats.

Quantitative Reasoning:
While many courses will integrate quantitative analysis and reasoning, such as genetic mapping (HMB265H1), or statistically analyzing altered physical parameters due to exercise (HMB471H1), the program also requires that students take basic statistics courses (HMB325H1/STA220H1/STA288H1/PSY201H1) that will serve as a foundation for understanding concepts and analyzing research in other courses.

Social and Ethical Responsibility:
Several courses will introduce students to some of the bioethical, social and health policy issues and controversies surrounding specific topics in health and disease, such as AIDS (HAJ453H1), and dementia (HMB440H1). The overall objective is to challenge students to think about the benefits of health and disease research, and the limits of these benefits, on society, including medicine, law and biotechnology.

An Integrative, Inquiry Based Activity:
Seminar courses at the 400-level provide a major opportunity for students to integrate knowledge from across a spectrum of health and disease related courses. Students in the specialist program are required to complete a full-year research project course or a summer research project course (HMB496Y1/HMB499Y1). Students will typically identify suitable supervisors in hospital research institutes or campus-based laboratories and research groups. Research project course oversight includes a HMB faculty advisor facilitates the placements, guide workshops on research presentation skills or apply statistical analyses (in collaboration with Department of Statistical Sciences), as well as organize research presentation days (with research faculty to serving as assessors). Students gain invaluable first-hand experience integrating their knowledge of health and disease and other related subjects, learn to apply their quantitative reasoning and analytical skills, practice effective communication and team-based learning, and learn about ethical standards in research.

Program Delivery:
**Method:** In Class; Online

**Mode:** Full Time; Part Time

Brief Description of the Proposal:
Modification of how the Calendar listing is organized for better clarity and purpose of program requirements. The total number of FCE required has been reduced from 13.5 FCE to 13.0 FCE. Update of specialist enrolment criteria to better demonstrate and offer more transparency on criteria already being used for specialist enrolment.

Details of Proposed Change:
The total number of FCE required has been reduced to 13.0 FCE from 13.5 FCE as part of the re-alignment of the programs requirements. HMB322H1 (Topics in Health & Disease) is now a required course and will further enhance the histology learned in HMB302H1 (Histology) and will help provide a full foundation of students interested in health and disease sciences. A research based course in addition to a required lab course is now required to again ensure that a full foundation is provided to the specialist students in the Health & Disease program as research based skills are acquired in both a lab and in the classroom vis a vis literature reviews, grant proposals, application of knowledge transfer, etc.
The requisite line of 1.0 FCE from further courses that focus on the structure and function of the human body: ANA300Y1 / IMM340H1 / IMM350H1 / MGY377H1/ MGY378H1/ CSB351Y1 has been moved and incorporated into the required 2.0 FCE of higher-year Health & Disease concentration courses. PSL300H1 and PSL301H1 are still required. This is to allow students to have more flexibility in self-guiding their academic interests.

The update of the specialist enrolment criteria is designed to better demonstrate and offer more transparency on criteria already being used for enrolment into this program as students not entering from first year have their second year courses assessed.

Rationale:

The Human Biology Program completed a self-study in March 2014 that the program and the Faculty of Arts & Science has been steadily working on the recommendations to enhance the overall quality of the program. Many of the recommendations have already been put into effect: our smallest program (Health Care Ethics major) has been closed for further admissions and a proposal to formally close the program will be put forward in October 2017, we have signed a MOA giving the School of the Environment full ownership of the Environment and Health major and specialist (ASMAJ0365 and ASSPE0365) and have agreed to continue teaching and supporting the capstone requirement course for the specialist program: JEH455H1 (Topics in Environment & Health) and giving Environment and Health students enrolment priority in a number of our courses.

One of the first acts was a revision of the Health & Disease (ASMAJ2013 & ASSPE2013), Neuroscience (ASMAJ1472 and ASSEPE1472), and our then- Genes, Genetics, and Biotechnology, now Fundamental Genetics and its Applications program (ASMAJ1050 and ASSPE1050), and Human Biology (ASMAJ2035) programs to better align the programs with the teaching strengths of the unit, the resources of the unit, and the course offerings within the Faculty of Arts & Science. These modifications came into effect in 2015-2016.

This realignment of four of our five programs has benefited the program as a whole and our students greatly, and have allowed us to see more clearly where there are gaps in the program structure and program objectives, as well as allowing us to see how to better align the programs with their objectives, as outlined in 2015.

Since then, we have consulted with the Dalla Lana School of Public Health on pedagogy revisions for our Global Health major and Specialist (ASMAJ25757 and ASSPE2575), and have consulted with our faculty and staff to better assess pedagogy gaps and inconsistencies in program structure and pressure points within our programs in terms of enrollment and student outcomes. Many of the gaps/alignment were due to lack of lab space, staff, support, or lack of faculty to teach core courses.

Even in the 2015 major modification proposal, it was outlined that HMB has been working closely with [the Cell Systems and Biology Department], [the Department of Ecology and Evolutionary Biology] and the [Faculty of Arts & Science] to expand and modernize lab course offerings in the planned renovations of the [Ramsay Wright] teaching labs. However, at the time of the proposal, the labs were not yet constructed. Construction began in spring 2015 and they are currently nearing completion. HMB teaching labs will be ready for full-time use by September 2017. As such, we wish to utilize these labs in our HMB courses to better meet listed course objectives for the benefit of our students.

Since many of the recommendations from the external review have been met, and now that HMB has more staff support including 2 lab technicians, a more clear vision, our own teaching labs (which will allow us to use the space more frequently), and have been approved to hire an appointed faculty member starting in July 2017 (the search is currently ongoing) who will allow us to offer more course sections of some of our courses without overburdening teaching assignments, we would like to make further revisions to better meet objectives outlined in 2014.

The proposed restructuring of all of our programs is the next step in further defining improvements and innovations first initiated in 2015-2016.

Impact that the proposal may have on students or other academic units/divisions:

Impact on other units should be minimal as enrolment is not planned to increase. The majority of the courses required in the program are the same course requirement/ requirement options as the current neuroscience major. Impact on our unit should also not increase as we have increased staff support. The Health & Disease specialist program is a Type 3 limited enrolment program and is capped at 44 students per cohort year (to guarantee they have a space in one of the lab courses we require them to take). The total program enrolment this year is 67, and the two year average is 60. We do not anticipate this specialist program decreasing or increasing in size.

Consultation:

Director Dr. Melanie Woodin has consulted extensively with Vice-Deans Pamela Klassen and Poppy Lockwood as well as with faculty within the Human Biology program. After consultations with Biochemistry in January 2017, we have eliminated the option to use CHM247H1 in lieu of BCH210H1.

The following consultations were due to feedback from the Life Science Planning Meeting in January 2017:
After consultations with EEB in January 2017, EHJ352H1 has been added as a course option for higher year Health & Disease concentration courses. BIO220H1 is now included in the admissions criteria for students applying with 8.0 or more FCE complete.

After consultations with Pathobiology in January 2017, LMP365H1 has been removed as a course option for higher year Health & Disease concentration courses, and replaced with LMP363H1.

Diversity:
The re-design of the Health & Disease program ensures all students receive a solid foundation in both health systems and disease systems in the human body. HMB works closely with Accessibility Services, and accommodations requested are met. This will not change. Further, many of our faculty work to offer a variety of assignments that better provide to a variety of learners in their courses.

Resource Implications:
Current support is adequate.

Faculty and TA Support:
Current support is adequate.