

**UNIVERSITY OF WINDSOR**  
**UNIVERSITY PROGRAM REVIEW (UPR)**  
**REPORT ON: Biological Sciences**  
**GRADUATE AND UNDERGRADUATE PROGRAMS**  
 March 2018

**EXECUTIVE SUMMARY**

**Review Preparation**

In preparing this document, the Program Development Committee reviewed the following: Biological Science’s Self-Study (SS) (2015/2016), the report of the external reviewers (ER) (October 2017), the response from the Head (HR) (November 2017), and the response from the Dean (DR) (January 2018) to the above material. The external reviewers were: Dr. Suzie Currie, Department of Biology, Mount Allison University, Dr. Jack Gray, Department of Biology, University of Saskatchewan, and Dr. Cheri McGowan, Faculty of Human Kinetics, University of Windsor.

**Undergraduate and Graduate Programs**

At the undergraduate level, the Department offers a Bachelor of Science (Honours) in Biological Sciences (with/without thesis), and a Bachelor of Science (Honours) in Molecular Biology and Biotechnology. The Department also collaborates with the Department of Chemistry and Biochemistry to offer a Bachelor of Science (Honours) in Biology and Biochemistry (Health and Biomedical Stream), with the Department of Psychology to offer a Bachelor of Science (Honours) in Behaviour, Cognition and Neuroscience, and with the Faculty of Education to offer a Concurrent Bachelor of Science (Honours) Biological Sciences (with/without thesis)/Bachelor of Education. However, admissions to the latter have been suspended since Fall 2014.

Students also have the option of combining their Honours Biological Sciences major with a major from another discipline.

The Department offers a Minor in Biological Sciences, as well as Major and Minor Concentrations in Biological Sciences for the Bachelor of Interdisciplinary Arts and Science.

At the graduate level, the Department offers a Master of Science in Biological Sciences, and a PhD in Biological Sciences.

**Enrolments**

**Undergraduate\***

	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017
<b>Full-Time</b>	605.04	622.61	579.42	567.58	605.70
<b>Part-Time</b>	100.80	89.24	97.40	71.70	87.90

*\*Enrolment numbers for the General Science program are split 60/40 between Biology and Chemistry.*

**Graduate**

	Fall 2013	Fall 2014	Fall 2015	Fall 2016	Fall 2017
<b>Full-Time</b>	49	50	45	42	43
<b>Part-Time</b>	4	2	2	2	1

**Human Resources**

**Faculty/Instructors**

Tenure/tenure-track faculty	20 (including three cross-appointments)
AAS Learning Specialists	4
Sessional Lecturers	1
Faculty members involved in graduate program delivery	17

## Full/Part-time Staff

Administrative Financial Clerk	.7
Biology Technician	1
Biotechnology Program Technician	.5
Facilities Maintenance Technician	1
Laboratory Demonstrator	.75
Laboratory Technician	.75
Receptionist Secretary	.7
Secretary to the Head/Graduate Program Secretary	1
Secretary	1
Technician	1

## FINAL ASSESSMENT REPORT (with Implementation Plan)

### Significant Strengths of the Programs

The External Reviewers commended Biological Sciences on the exceptional level of student engagement in the Department, and its quality faculty dedicated to providing experiential learning opportunities and “cutting-edge field and lab research” experiences to both graduate and undergraduate students in all its programs. (ER, p.2, p.3, p.11, p.12) “Faculty are generally strong, internationally recognized researchers” and “[s]tudents receive significant internal and external funds and are well supported.” (ER, p. 10, p.12)

The External Reviewers also drew special attention to the Department’s retention programs, noting that “[t]he First Year Survival Guide is an excellent and supportive guide for new students, as is the MySci mentoring program” which matches first-year students with upper-year students, and were equally “impressed with the graduate student 4-week orientation where incoming students learn how to succeed as a graduate student.” (ER, p.3, p.11)

### Opportunities for Program Improvement/Enhancements

The External Reviewers raised concerns related to facilities renewal, citing potential health and safety concerns. If it has not already done so, the Department should develop a plan for the renewal of research and teaching equipment. (ER, p.5, p.6) The External Reviewers also stressed that efforts to improve workplace climate within the Department ought to be prioritized, to enable faculty to focus on the delivery of high quality undergraduate and graduate programs and research, and “allow the Department to realize its full potential as a leading academic unit in the university, the province and the country.” (ER, p.12, DR, p.1)

These and other opportunities for program improvements are captured in the recommendations listed below.

## IMPLEMENTATION PLAN

### Recommendations (in priority order)

*(Final recommendations arrived at by the Program Development Committee, following a review and assessment of the External Reviewers report, the Head’s response, and the Dean’s response.)*

**Recommendation 1:** That the Department submit program-level learning outcomes for its Combined Honours Biology program and concurrent BSc in Biology/Education program, engage in curricular planning and mapping for each of its programs, and submit course-level learning outcomes and assessment methods for each of its courses that clearly correspond to the program-level learning outcomes. As part of the curriculum planning exercise, that the Department report on efforts to integrate Indigenous ways of knowing into the curriculum.

**Agents:** Department Council, Head, CTL, Vice-Provost, Teaching and Learning

**Completion by:** Fall 2019

*[See attached for Program Learning Outcomes for Honours BSc in Biological Sciences (with/without thesis), Honours BSc in Molecular Biology and Biotechnology (MBB), Honours BSc in Behaviour, Cognition and Neuroscience, Honours BSc in Biology and Biochemistry (Health and Biomedical Stream), MSc in Biological Sciences and PhD in Biological Sciences.]*

**Recommendation 2:** That the Department, with the assistance of the Dean of Science, engage in an external mediation process to resolve the conflict that exists amongst the three programs, and submit an implementation plan with timelines to resolve remaining issues.

**Agents:** Faculty and staff members, Dean, Provost

**Completion by:** Fall 2019

**Recommendation 3:** That the Department establish:

- a) a policy by which the first graduate student committee meeting occurs within the first month following enrolment to establish a program of study that identifies and provides a timeline for required graduate courses.
- b) a common first-year graduate course, which will be an important component of this policy.

**Agents:** Head, Departmental Council

**Completion by:** Fall 2019

**Recommendation 4:** Working jointly with the Faculty of Science, that the Department provide full instructional support for core course offerings, particularly the Genetics and the Molecular Biology courses. (For example, AAS/LS lab coordination, lab instructor support, graduate assistants.)

**Agents:** Head

**Completion by:** Fall 2019

**Recommendation 5: That the Department**

- a) review its undergraduate completion rates for accuracy and report on strategies to address low completion rates, if applicable.
- b) develop and report on a mechanism for better tracking student success and pursuits post-graduation.

**Agents:** Head, Institutional Analysis, Alumni Affairs

**Completion by:** Fall 2019

**Recommendation 6:** That technical and administrative staff participate in Departmental committees and have input for decision-making.

**Agents:** Head, Departmental Council

**Completion by:** Fall 2019

**Recommendation 7:** That the Department, working with the Dean and the Provost, increase the pressure to have renovations/repairs to outdated/non-functioning spaces within the Biology Building funded. The lack of timely repairs to core facilities has significantly impaired the proper functionality of these spaces and has compromised ongoing experiments. Many of these repairs revolve around heating and cooling issues that should not be left to the Department to resolve with an inappropriate budget and therefore the Head is encouraged to continue to regularly make a case, with the assistance of the Dean, for funding for renovations. Perhaps, more importantly, these issues raise serious concerns with the health and safety of the people working in the Department.

**Agents:** Head, Dean, Provost, VP Planning and Administration

**Completion by:** Fall 2019

**Recommendation 8:** That the allocation of GAs and TAs be communicated transparently and within a timely manner.

**Agents:** Head

**Completion by:** Fall 2019

**UNDERGRADUATE**

**Honours BSc in Biological Sciences (with/without thesis)**

<p><b>Program Learning Outcomes</b></p> <p><u>At the end of this program, the successful student will know and be able to:</u></p>	<p><b>Characteristics of a University of Windsor Graduate</b></p> <p><u>A U of Windsor graduate will have the ability to demonstrate:</u></p>	<p><b>COU-approved Undergraduate Degree Level Expectations</b></p>
<p>A.</p> <ul style="list-style-type: none"> <li>- Describe a wide range of core biological concepts that include molecular biology, genetics, ecology, and evolution.</li> <li>- Define the scientific method as it relates to research and societal issues.</li> <li>- Describe and integrate the relationship between biological structure and function at any level of the biological organization of life (molecular level to biosphere)</li> </ul> <p><b>Bachelor of Science – Biological Sciences with thesis:</b> Integrate acquired content into a specific research context</p>	<p>A. the acquisition, application and integration of knowledge</p>	<ol style="list-style-type: none"> <li>1. Depth and Breadth of Knowledge</li> <li>2. Knowledge of Methodologies</li> <li>3. Application of Knowledge</li> <li>5. Awareness of Limits of Knowledge</li> </ol>
<p>B.</p> <ul style="list-style-type: none"> <li>- locate and access resources and primary scientific literature information.</li> <li>- Conduct laboratory experiments accurately and safely, employing appropriate tools and procedures.</li> <li>- Formulate and test a hypothesis using appropriate methodologies.</li> </ul> <p><b>Bachelor of Science – Biological Sciences with thesis:</b> Design and conduct a research investigation that is thoughtfully situated in extant literature</p>	<p>B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)</p>	<ol style="list-style-type: none"> <li>1. Depth and Breadth of Knowledge</li> <li>2. Knowledge of Methodologies</li> <li>3. Application of Knowledge</li> <li>5. Awareness of Limits Knowledge</li> </ol>
<p>C.</p> <ul style="list-style-type: none"> <li>- critically analyze a biological topic and provide a justification for this evaluation</li> <li>- access and effectively utilize the primary research literature for solving problems</li> <li>- formulate and test hypotheses</li> </ul> <p><b>Bachelor of Science – Biological Sciences with thesis:</b> Apply the primary literature to a new research problem</p>	<p>C. critical thinking and problem-solving skills</p>	<ol style="list-style-type: none"> <li>1. Depth and Breadth of Knowledge</li> <li>2. Knowledge of Methodologies</li> <li>3. Application of Knowledge</li> <li>5. Awareness of Limits of Knowledge</li> </ol>
<p>D.</p> <ul style="list-style-type: none"> <li>- write a formal paper with the correct structure (e.g. include proper citations, references, etc.)</li> <li>- express complex concepts in written form</li> <li>- analyze data and interpret results of biological research</li> <li>- solve quantitative problems</li> </ul> <p><b>Bachelor of Science – Biological Sciences with thesis:</b> write a research paper in a publishable format</p>	<p>D. literacy and numeracy skills</p>	<ol style="list-style-type: none"> <li>4. Communication Skills</li> <li>5. Awareness of Limits of Knowledge</li> </ol>

<b>Program Learning Outcomes</b>  <u>At the end of this program, the successful student will know and be able to:</u>	<b>Characteristics of a University of Windsor Graduate</b>  <u>A U of Windsor graduate will have the ability to demonstrate:</u>	<b>COU-approved Undergraduate Degree Level Expectations</b>
E. - provide evidence of basic technical skills and safe practice in a laboratory or field situation - recognize and practice the rules of academic integrity - <b>Bachelor of Science – Biological Sciences with thesis:</b> conduct independent research. (Also relevant to B)	E. responsible behaviour to self, others and society	5. Awareness of Limits of Knowledge 6. Autonomy and Professional Capacity
F. - produce an effective communication (e.g. paper, presentation, website, etc.) on a biological subject. - qualitatively summarize and objectively present data  <b>Bachelor of Science – Biological Sciences with thesis:</b> Formulate an in-depth research report and communicate the results in a community setting (Also relevant to B)	F. interpersonal and communications skills	4. Communication Skills 6. Autonomy and Professional Capacity
G. - participate constructively and cooperatively in group activities  <b>Bachelor of Science – Biological Sciences with thesis:</b> Work as part of a team in a research setting.	G. teamwork, and personal and group leadership skills	4. Communication Skills 6. Autonomy and Professional Capacity
H. - analyze methodology used to distinguish between different functionalities of diverse biological systems - Design innovative solutions to demonstrate biological concepts	H. creativity and aesthetic appreciation	2. Knowledge of Methodologies 3. Application of Knowledge 6. Autonomy and Professional Capacity
I. - Predict future patterns based on present data on the rapidly changing nature of biology - apply knowledge and skills to present issues	I. the ability and desire for continuous learning	6. Autonomy and Professional Capacity

**Honours BSc in Molecular Biology and Biotechnology (MBB)**

<p><b>Program Learning Outcomes</b></p> <p><u>At the end of this program, the successful student will know and be able to:</u></p>	<p><b>Characteristics of a University of Windsor Graduate</b></p> <p><u>A U of Windsor graduate will have the ability to demonstrate:</u></p>	<p><b>COU-approved Undergraduate Degree Level Expectations</b></p>
<p>A.</p> <ul style="list-style-type: none"> <li>- Describe a wide range of core biological concepts that include molecular biology, genetics, ecology, and evolution.</li> <li>- Define the scientific method as it relates to research and societal issues</li> <li>- Describe and integrate the relationship between biological structure and function at any level of the biological organization of life (molecular level to biosphere)</li> <li>- Illustrate an advanced understanding of cellular and molecular biology concepts.</li> </ul>	<p>A. the acquisition, application and integration of knowledge</p>	<ol style="list-style-type: none"> <li>1. Depth and Breadth of Knowledge</li> <li>2. Knowledge of Methodologies</li> <li>3. Application of Knowledge</li> <li>5. Awareness of Limits of Knowledge</li> </ol>
<p>B.</p> <ul style="list-style-type: none"> <li>- locate and access resources and primary scientific literature information in molecular biology and biotechnology.</li> <li>- Conduct safe laboratory experiments in molecular biology and biotechnology</li> <li>-Develop a research proposal with literature citations to address research hypotheses in the area of molecular biology and biotechnology.</li> </ul>	<p>B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)</p>	<ol style="list-style-type: none"> <li>1. Depth and Breadth of Knowledge</li> <li>2. Knowledge of Methodologies</li> <li>3. Application of Knowledge</li> <li>5. Awareness of Limits Knowledge</li> </ol>
<p>C.</p> <ul style="list-style-type: none"> <li>- Critically analyze a topic in molecular biology and provide a justification for this evaluation</li> <li>- access and effectively utilize the primary research literature for solving problems in Biology and Biotechnology</li> <li>- formulate and test hypotheses</li> <li>- Apply the primary literature to a new research problem in molecular biology or biotechnology</li> </ul>	<p>C. critical thinking and problem-solving skills</p>	<ol style="list-style-type: none"> <li>1. Depth and Breadth of Knowledge</li> <li>2. Knowledge of Methodologies</li> <li>3. Application of Knowledge</li> <li>5. Awareness of Limits of Knowledge</li> </ol>
<p>D.</p> <ul style="list-style-type: none"> <li>- write a formal paper with the correct structure (e.g. include proper citations, references, etc.)</li> <li>- express complex concepts in written form</li> <li>-demonstrate an ability to analyze data and interpret results demonstrate an ability to solve quantitative problems</li> </ul>	<p>D. literacy and numeracy skills</p>	<ol style="list-style-type: none"> <li>4. Communication Skills</li> <li>5. Awareness of Limits of Knowledge</li> </ol>
<p>E.</p> <ul style="list-style-type: none"> <li>- Show advanced research skills in a molecular biology laboratory setting</li> <li>- recognize and practice the rules of academic integrity as appropriate to the program</li> </ul>	<p>E. responsible behaviour to self, others and society</p>	<ol style="list-style-type: none"> <li>5. Awareness of Limits of Knowledge</li> <li>6. Autonomy and Professional Capacity</li> </ol>

<b>Program Learning Outcomes</b>	<b>Characteristics of a University of Windsor Graduate</b>	<b>COU-approved Undergraduate Degree Level Expectations</b>
<u>At the end of this program, the successful student will know and be able to:</u>	<u>A U of Windsor graduate will have the ability to demonstrate:</u>	
F. Formulate an in-depth research report and communicate the results in a community setting qualitatively summarize and objectively present data (Also relevant to B)	F. interpersonal and communications skills	4. Communication Skills 6. Autonomy and Professional Capacity
G. - participate constructively and cooperatively in group activities - Work as part of a team in a research setting	G. teamwork, and personal and group leadership skills	4. Communication Skills 6. Autonomy and Professional Capacity
H. - analyze methodology used to distinguish between different functionalities of diverse biological systems - Design innovative solutions to demonstrate biological concepts	H. creativity and aesthetic appreciation	2. Knowledge of Methodologies 3. Application of Knowledge 6. Autonomy and Professional Capacity
I. - Predict future patterns based on present data on the rapidly changing nature of biology apply knowledge and skills to present issues	I. the ability and desire for continuous learning	6. Autonomy and Professional Capacity

### Honours BSc in Behaviour, Cognition and Neuroscience (BCN)

<b>Program Learning Outcomes</b>	<b>Characteristics of a University of Windsor Graduate</b>	<b>COU-approved Undergraduate Degree Level Expectations</b>
<u>At the end of this program, the successful student will know and be able to:</u>	<u>A U of Windsor graduate will have the ability to demonstrate:</u>	
A. - Describe a wide range of core biological and psychological concepts. - Define the scientific method as it relates to research and societal issues - describe and integrate the relationship between biological structure and function at any level of the biological organization of life and the interactions between biological and psychological concepts - Integrate acquired content into a specific research context	A. the acquisition, application and integration of knowledge	1. Depth and Breadth of Knowledge 2. Knowledge of Methodologies 3. Application of Knowledge 5. Awareness of Limits of Knowledge

<b>Program Learning Outcomes</b>  <u>At the end of this program, the successful student will know and be able to:</u>	<b>Characteristics of a University of Windsor Graduate</b>  <u>A U of Windsor graduate will have the ability to demonstrate:</u>	<b>COU-approved Undergraduate Degree Level Expectations</b>
<b>B.</b> - locate and access resources and integrate scientific literature information - Conduct laboratory experiments accurately and safely in the area of neuroscience - Develop a research proposal with literature citations to address research hypotheses in the area of biological or psychological neuroscience.	<b>B.</b> research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)	1. Depth and Breadth of Knowledge 2. Knowledge of Methodologies 3. Application of Knowledge 5. Awareness of Limits Knowledge
<b>C.</b> - critically analyze a topic and provide a justification for this evaluation - access and effectively utilize the primary research literature for solving problems in neuroscience - formulate and test hypotheses Apply the primary literature to a new research problem appropriate to introductory research in neuroscience	<b>C.</b> critical thinking and problem-solving skills	1. Depth and Breadth of Knowledge 2. Knowledge of Methodologies 3. Application of Knowledge 5. Awareness of Limits of Knowledge
<b>D.</b> - write a formal paper with the correct structure (e.g. include proper citations, references, etc.) - express complex concepts in written form - analyze data and interpret results - solve quantitative problems - write a coherent or complete research project in a publishable format in a neuroscience field	<b>D.</b> literacy and numeracy skills	4. Communication Skills 5. Awareness of Limits of Knowledge
<b>E.</b> - provide evidence of basic technical skills and safe practice in a laboratory situation - recognize and practice the rules of academic integrity as appropriate to your program - conduct independent research	<b>E.</b> responsible behaviour to self, others and society	5. Awareness of Limits of Knowledge 6. Autonomy and Professional Capacity
<b>F.</b> - produce an effective communication (e.g. paper, presentation, website, etc.) on a biological subject based on the individual's ability to acquire and interpret relevant information. - qualitatively summarize and objectively present data - Formulate a research paper and communicate the results in a community	<b>F.</b> interpersonal and communications skills	4. Communication Skills 6. Autonomy and Professional Capacity
<b>G.</b> - participate constructively and cooperatively in group activities Work as part of a team in a research setting.	<b>G.</b> teamwork, and personal and group leadership skills	4. Communication Skills 6. Autonomy and Professional Capacity

<b>Program Learning Outcomes</b>	<b>Characteristics of a University of Windsor Graduate</b>	<b>COU-approved Undergraduate Degree Level Expectations</b>
<u>At the end of this program, the successful student will know and be able to:</u>	<u>A U of Windsor graduate will have the ability to demonstrate:</u>	
H. - Analyze methodology used to distinguish between functionalities of diverse biological and psychological systems - Design innovative solutions to biological and physiological concepts.	H. creativity and aesthetic appreciation	2. Knowledge of Methodologies 3. Application of Knowledge 6. Autonomy and Professional Capacity
I. - Predict future patterns based on present data on the rapidly changing nature of biology - apply knowledge and skills to present issues	I. the ability and desire for continuous learning	6. Autonomy and Professional Capacity

### Honours BSc in Biology and Biochemistry (Health and Biomedical Stream)

<b>Program Learning Outcomes</b>	<b>Characteristics of a University of Windsor Graduate</b>	<b>COU-approved Undergraduate Degree Level Expectations</b>
<u>At the end of this program, the successful student will know and be able to:</u>	<u>A U of Windsor graduate will have the ability to demonstrate:</u>	
A. - describe and apply a wide range of core biomedical concepts. - apply the scientific method as it relates to research and societal issues. - describe the relationship between chemical and biological structure and function at all levels of the organization of life (molecular level to biosphere). - apply key chemical and biological principles in a biomedical context.	A. the acquisition, application and integration of knowledge	1. Depth and Breadth of Knowledge 2. Knowledge of Methodologies 3. Application of Knowledge 5. Awareness of Limits of Knowledge
B. - collect, read, analyze, synthesize and evaluate relevant scientific literature to address a specific health/biomedical science area.	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)	1. Depth and Breadth of Knowledge 2. Knowledge of Methodologies 3. Application of Knowledge 5. Awareness of Limits Knowledge
C. - critically analyze a biomedical topic and provide a justification for this analysis. - access and effectively utilize the primary research literature for solving biological and biochemical problems.	C. critical thinking and problem-solving skills	1. Depth and Breadth of Knowledge 2. Knowledge of Methodologies 3. Application of Knowledge

<b>Program Learning Outcomes</b>  <u>At the end of this program, the successful student will know and be able to:</u>	<b>Characteristics of a University of Windsor Graduate</b>  <u>A U of Windsor graduate will have the ability to demonstrate:</u>	<b>COU-approved Undergraduate Degree Level Expectations</b>
<ul style="list-style-type: none"> <li>- formulate and test hypotheses</li> </ul>		5. Awareness of Limits of Knowledge
D. <ul style="list-style-type: none"> <li>- write a formal paper with the correct structure (e.g., include proper citations, references, etc.)</li> <li>- express complex biological and biochemical concepts in written form.</li> <li>- analyze biological and biochemical data and interpret results.</li> <li>- solve quantitative problems</li> </ul>	D. literacy and numeracy skills	4. Communication Skills 5. Awareness of Limits of Knowledge
E. <ul style="list-style-type: none"> <li>- demonstrate basic biology and biochemistry techniques, use of common biological/biochemical lab equipment, and safe laboratory practice.</li> <li>- follow the rules of academic integrity appropriate to the discipline.</li> </ul>	E. responsible behaviour to self, others and society	5. Awareness of Limits of Knowledge 6. Autonomy and Professional Capacity
F. <ul style="list-style-type: none"> <li>- produce an effective communication on a biological/biochemical subject.</li> <li>- qualitatively summarize and objectively present data.</li> </ul>	F. interpersonal and communications skills	4. Communication Skills 6. Autonomy and Professional Capacity
G. <ul style="list-style-type: none"> <li>- participate constructively and cooperatively in group activities.</li> </ul>	G. teamwork, and personal and group leadership skills	4. Communication Skills 6. Autonomy and Professional Capacity
H. <ul style="list-style-type: none"> <li>- describe examples that illustrate the functionality and diversity of biological systems.</li> <li>- Design innovative solutions to demonstrate biomedical concepts.</li> </ul>	H. creativity and aesthetic appreciation	2. Knowledge of Methodologies 3. Application of Knowledge 6. Autonomy and Professional Capacity
I. <ul style="list-style-type: none"> <li>- apply biological and chemical knowledge and laboratory skills to solve relevant issues in the biomedical field.</li> <li>- collect, read, and evaluate the most current literature in the rapidly changing field of health and biomedical sciences</li> </ul>	I. the ability and desire for continuous learning	6. Autonomy and Professional Capacity

**GRADUATE**  
**MSc in Biological Sciences**

<p><b>Program Learning Outcomes (Degree Level Expectations)</b>  <i>This is a sentence completion exercise. Please provide a minimum of 1 learning outcome for each of the boxes associated with a graduate attribute.</i></p> <p><u>At the end of this program, the successful student will know and be able to:</u></p>	<p><b>Characteristics of a University of Windsor Graduate</b></p>	<p><b>OCGS-approved Graduate Degree Level Expectations</b></p>
<p><b>A.</b>            - demonstrate an advanced understanding of biological concepts in the area under investigation.            - demonstrate a sophisticated understanding of research themes across biological science</p> <p><b>+ MSc. – Biological Sciences – Neuroscience and Behaviour:</b>            Same as above but with specific expertise in neuroscience</p>	<p>A UWindsor graduate will have the ability to demonstrate:</p> <p>A. the acquisition, application and integration of knowledge</p>	<p>1. Depth and Breadth of Knowledge            2. Research and Scholarship            3. Level of Application of Knowledge            6. Awareness of Limits of Knowledge</p>
<p><b>B.</b>            - Design an independent research project in cognate discipline            - Extrapolate research findings to new areas of research</p> <p><b>+ MSc. – Biological Sciences – Neuroscience and Behaviour</b>            Same as above but with specific expertise in neuroscience</p>	<p>B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)</p>	<p>2. Research and Scholarship            3. Level of Application of Knowledge            6. Awareness of Limits of Knowledge</p>
<p><b>C.</b>            - Troubleshoot problems that arise in conduct of research            - Formulate and test specific hypotheses            - Develop an ability to conduct research independently            - Evaluate data and interpret results in a scientific context            -</p> <p><b>+ MSc. – Biological Sciences – Neuroscience and Behaviour</b>            Same as above but with specific expertise in neuroscience</p>	<p>C. critical thinking and problem-solving skills</p>	<p>1. Depth and Breadth of Knowledge            2. Research and Scholarship            3. Level of Application of Knowledge            4. Professional Capacity/autonomy</p>
<p><b>D.</b>            - Write a research paper with at least one publishable data chapter.            - conduct novel research in cognate area</p> <p><b>+ MSc. – Biological Sciences – Neuroscience and Behaviour</b>            Same as above but with specific expertise in neuroscience</p>	<p>D. literacy and numeracy skills</p>	<p>2. Research and Scholarship            5. Level of Communication Skills</p>
<p><b>E.</b>            - Conduct research with the highest degrees of scientific integrity            - Provide constructive criticism to others</p> <p><b>+ MSc. – Biological Sciences – Neuroscience and Behaviour</b>            Same as above but with specific expertise in neuroscience</p>	<p>E. responsible behaviour to self, others and society</p>	<p>4. Professional Capacity/Autonomy            6. Awareness of Limits of Knowledge</p>

<p><b>F.</b></p> <ul style="list-style-type: none"> <li>- Synthesize original results into a publishable</li> <li>- Communicate research results to a broad audience</li> <li>- Defend research to specialists in cognate area</li> </ul> <p><b>+ MSc. – Biological Sciences – Neuroscience and Behaviour</b> Same as above but with specific expertise in neuroscience</p>	<p>F. interpersonal and communications skills</p>	<p>5. Level of Communication Skills</p>
<p><b>G.</b></p> <ul style="list-style-type: none"> <li>- work effectively in a research lab setting</li> <li>- Teach effectively in an undergraduate course setting</li> <li>- Provide constructive feedback to peers and colleagues</li> </ul> <p><b>+ MSc. – Biological Sciences – Neuroscience and Behaviour</b> Same as above but with specific expertise in neuroscience</p>	<p>G. teamwork, and personal and group leadership skills</p>	<p>4. Professional Capacity/Autonomy 5. Level of Communication Skills</p>
<p><b>H.</b></p> <ul style="list-style-type: none"> <li>- design original research hypotheses and experiments to address novel questions.</li> </ul> <p><b>+ MSc. – Biological Sciences – Neuroscience and Behaviour</b> Same as above but with specific expertise in neuroscience</p>	<p>H. creativity and aesthetic appreciation</p>	<p>2. Research and Scholarship 4. Professional Capacity/autonomy 6. Awareness of Limits of Knowledge</p>
<p><b>I.</b></p> <ul style="list-style-type: none"> <li>- stay abreast of current literature in research area</li> </ul> <p><b>+ MSc. – Biological Sciences – Neuroscience and Behaviour</b> Same as above but with specific expertise in neuroscience</p>	<p>I. the ability and desire for continuous learning</p>	<p>4. Professional Capacity/autonomy</p>

### PhD in Biological Sciences

<p><b>Program Learning Outcomes (Degree Level Expectations)</b> <i>This is a sentence completion exercise. Please provide a minimum of 1 learning outcome for each of the boxes associated with a graduate attribute.</i></p> <p><u>At the end of this program, the successful student will know and be able to:</u></p>	<p><b>Characteristics of a University of Windsor Graduate</b></p> <p><u>A UWindsor graduate will have the ability to demonstrate:</u></p>	<p><b>OCGS-approved Graduate Degree Level Expectations</b></p>
<p>A.</p> <ul style="list-style-type: none"> <li>- explain the scientific concepts key to the biological concepts in the specific area under investigation.</li> <li>- Integrate concepts in research themes across biological science</li> </ul> <p><b>-+ PhD – Biological Sciences – Neuroscience and Behaviour:</b> Same as above but with specific expertise in neuroscience</p>	<p>A. the acquisition, application and integration of knowledge</p>	<p>1. Depth and Breadth of Knowledge 2. Research and Scholarship 3. Level of Application of Knowledge 6. Awareness of Limits of Knowledge</p>

<p>B.</p> <ul style="list-style-type: none"> <li>- Design an independent and multifaceted research project in cognate discipline</li> <li>- synthesize the literature across a wide range of biological disciplines, with special expertise in cognate area</li> <li>- Conduct novel research that makes a substantive contribution to extant literature in the area of specialization</li> <li>- Relate research to previous findings and guide the field on productive areas for future research</li> </ul> <p><b>+ PhD – Biological Sciences – Neuroscience and Behaviour</b> Same as above but with specific expertise in neuroscience</p>	<p>B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)</p>	<ul style="list-style-type: none"> <li>2. Research and Scholarship</li> <li>3. Level of Application of Knowledge</li> <li>6. Awareness of Limits of Knowledge</li> </ul>
<p>C.</p> <ul style="list-style-type: none"> <li>- Troubleshoot problems that arise in the conduct of research</li> <li>- Formulate and test specific hypotheses</li> <li>- conduct independent research and design new experimental approaches</li> <li>- Evaluate data and interpret results in a scientific context</li> </ul> <p><b>+ PhD – Biological Sciences – Neuroscience and Behaviour :</b> Same as above but with specific expertise in neuroscience</p>	<p>C. critical thinking and problem-solving skills</p>	<ul style="list-style-type: none"> <li>1. Depth and Breadth of Knowledge</li> <li>2. Research and Scholarship</li> <li>3. Level of Application of Knowledge</li> <li>4. Professional Capacity/autonomy</li> <li>6. Awareness of Limits of Knowledge</li> </ul>
<p>D.</p> <ul style="list-style-type: none"> <li>- Write a coherent, independent, publishable research papers.</li> <li>- Present research professionally, accurately and concisely at a scientific conference in cognate area</li> </ul> <p><b>+ PhD – Biological Sciences – Neuroscience and Behaviour:</b> Same as above but with specific expertise in neuroscience</p>	<p>D. literacy and numeracy skills</p>	<ul style="list-style-type: none"> <li>2. Research and Scholarship</li> <li>5. Level of Communication Skills</li> </ul>
<p>E.</p> <ul style="list-style-type: none"> <li>- Conduct research with the highest degrees of scientific integrity</li> <li>- Provide constructive criticism to peers and colleagues.</li> <li>- mentor graduate and undergraduate students on proper conduct of research</li> </ul> <p><b>+ PhD – Biological Sciences – Neuroscience and Behaviour:</b> Same as above but with specific expertise in neuroscience</p>	<p>E. responsible behaviour to self, others and society</p>	<ul style="list-style-type: none"> <li>4. Professional Capacity/Autonomy</li> <li>6. Awareness of Limits of Knowledge</li> </ul>
<p>F.</p> <ul style="list-style-type: none"> <li>- See section D above</li> <li>-</li> </ul> <p><b>+ PhD – Biological Sciences – Neuroscience and Behaviour:</b> Same as above but with specific expertise in neuroscience</p>	<p>F. interpersonal and communications skills</p>	<ul style="list-style-type: none"> <li>5. Level of Communication Skills</li> </ul>

<p>G.</p> <ul style="list-style-type: none"> <li>- work effectively in a research lab setting</li> <li>- Teach effectively in an undergraduate course setting</li> <li>- Provide constructive feedback to fellow peers and novice researchers.</li> </ul> <p><b>+ PhD – Biological Sciences – Neuroscience and Behaviour</b> Same as above but with specific expertise in neuroscience</p>	<p>G. teamwork, and personal and group leadership skills</p>	<p>4. Professional Capacity/Autonomy 5. Level of Communication Skills</p>
<p>H.</p> <ul style="list-style-type: none"> <li>- demonstrate creativity in expressing biological concepts and in design effective experiments to test hypotheses.</li> </ul> <p><b>+ PhD – Biological Sciences – Neuroscience and Behaviour:</b> Same as above but with specific expertise in neuroscience</p>	<p>H. creativity and aesthetic appreciation</p>	<p>2. Research and Scholarship 4. Professional Capacity/autonomy 6. Awareness of Limits of Knowledge</p>
<p>I.</p> <ul style="list-style-type: none"> <li>- - stay abreast of current and future plans in research area</li> <li>-- write a novel NSERC- or CIHR-style proposal</li> </ul> <p><b>+ PhD – Biological Sciences – Neuroscience and Behaviour:</b> Same as above but with specific expertise in neuroscience</p>	<p>I. the ability and desire for continuous learning</p>	<p>4. Professional Capacity/autonomy</p>