

Department/Academic Unit: Department Biomedical & Molecular Sciences (DBMS): Ph.D.

Degree Level Expectations, Learning Outcomes, Indicators of Achievement and the Program Requirements that Support the Learning Outcomes

Degree Level Expectations (General descriptors from OCAV)	Learning Outcomes (program specific)** This degree is awarded to students who demonstrate:	Relevant Courses, Academic Requirement (requirements that contribute to the achievement of learning outcomes and degree expectations)	Indicators of Achievement As evidenced by...	Transferable Skills
<i>Depth and breadth of knowledge</i>	Graduating PhD students will demonstrate a thorough command of knowledge in the area of biomedical and molecular sciences which will support the student’s future academic activities or professional practice within government, private or civil society sectors (e.g. biotechnology companies, Health Canada, hospitals, teaching or research positions at colleges, universities or research institutes, postdoctoral fellowships, further studies in MBA, medicine, law). Graduating students will also demonstrate an expert knowledge of current practice, concepts and issues in their field of study.	With the exception of the thesis (BMED 999 see below), students with an MSc from a related field will normally not be required to take additional courses as part of the PhD. The Graduate Admission Committee will determine whether additional course work is required and will be based on the student’s background, previous coursework and/or field requirements and will be in line with the requirements for the MSc course work for each field (see page 7). All students are encouraged to take additional graduate-level courses when appropriate. Specific Field Course Requirements: <u>F1: Biochemistry and Cell Biology:</u> No specific additional coursework requirements. <u>F2: Experimental Medicine:</u> No specific additional coursework requirements.	Successful completion of any course requirements. Positive feedback from supervisor and advisory committee on progress. Successful completion of the comprehensive PhD examination, which will require demonstration of a thorough understanding of the principles of biomedical and molecular sciences to a level sufficient for medical and graduate student teaching. Demonstrated depth of knowledge in biomedical and molecular sciences as evidenced by performance in required exit seminar, including the ability to field questions related to biomedical and molecular	Excellent understanding of the field of biomedical and molecular sciences.

		<p><u>F3: Microbes, Immunity, and Inflammation:</u> No specific additional coursework requirements.</p> <p><u>F4: Reproduction and Developmental Sciences:</u> No specific additional requirements.</p> <p><u>F5: Therapeutics, Drug Development, and Human Toxicology:</u> If not taken during the MSc, PhD students in this field must complete PHAR 811*.</p> <p>ANAT, BCHM, MICR, PHAR and PHGY 999 - Doctoral Thesis Research (will be revised to BMED 999 - PhD Thesis Research).</p> <p>Required annually advisory committee meetings.</p> <p>Completion of comprehensive examination.</p>	<p>sciences.</p> <p>A defensible, well-written PhD thesis.</p>	
<i>Research and scholarship</i>	<p>Graduating PhD students will have the ability to conceptualize, design and implement research for the generation of new knowledge regarding biomedical and molecular sciences. Graduating students will have an understanding of the current literature to make informed conclusions on the interpretation of their research results. These results must be published or publishable in peer-reviewed journals.</p>	<p>Mandatory annual committee meetings.</p> <p>Mandatory PhD comprehensive examination.</p> <p>PhD thesis research and defense.</p>	<p>Positive feedback from supervisor and student advisory committee on progress following required annual committee meetings.</p> <p>Successful completion of the comprehensive PhD examination, which will require demonstrated ability to integrate knowledge and solve experimental problems and knowledge of methods</p>	<ul style="list-style-type: none"> -Innovation -Time management -Ability to plan -Work independently -Accept responsibility -Solve problems -Detail-oriented -Follow instruction -Safety conscious

			<p>applicable to biomedical and molecular sciences.</p> <p>Demonstrated ability to field questions related to their research methods, rationale and conclusions during required exit seminar, including the ability to defend their PhD thesis.</p>	
<i>Application of knowledge</i>	<p>Graduating PhD students will have an in depth understanding of the literature broadly relevant to their research area that informs the process of applying pre-existing knowledge to the creation and interpretation of new data. Graduating students will demonstrate competence in the research process using existing literature and their own preliminary results to formulate a novel hypothesis and the critical experiments to test this hypothesis. Graduating students will have an awareness of the importance of translation research and the application of basic research knowledge to improve human health. Graduating students will demonstrate integrity and honesty in the scientific process.</p>	<p>Mandatory annual committee meetings.</p> <p>Mandatory PhD comprehensive examination.</p> <p>PhD thesis research and defense.</p>	<p>Successful performance in courses (if applicable).</p> <p>Appropriately designed experiments resulting in presentation/publication of their research results.</p> <p>Successful completion of the comprehensive PhD examination, which will require demonstrated ability to integrate knowledge and solve experimental problems and knowledge of methods applicable to biomedical and molecular sciences.</p> <p>Successful performance during exit seminar and PhD oral defense.</p>	<ul style="list-style-type: none"> -Research-oriented -Critical thinking -Creative -Solve problems -Use complex equipment -Logical

<p><i>Communication skills</i></p>	<p>Graduating PhD students will have the ability to clearly articulate their research findings, their ideas, and their opinions both orally and in written format to both colleagues and non-professionals (including diverse audiences).</p>	<p>Mandatory PhD comprehensive examination.</p> <p>PhD thesis research and defense.</p>	<p>Positive feedback from supervisor and advisory committee on quality of required presentations.</p> <p>Successful presentation of research progress in seminars and potentially publications.</p> <p>Demonstrated ability to communicate appropriately in their capacity as a teaching assistant to undergraduate students.</p> <p>Successful completion of the comprehensive PhD examination, which will require demonstration of appropriate communication skills.</p> <p>Successful performance during oral PhD defense.</p>	<p>-Written communication</p> <p>-Articulate</p> <p>-Public speaking</p> <p>-Computer skills</p> <p>-Ability to edit</p>
<p><i>Autonomy and professional capacity</i></p>	<p>Graduating PhD students will possess the attributes necessary to support academic, personal and professional success, including mentoring, knowledge transfer, management, leadership and interpersonal skills. Graduating students will demonstrate the intellectual independence and self-learning skills required for continued professional development. Graduating students will have a solid grasp of</p>	<p>Mentoring by supervisor, colleagues and other faculty members.</p> <p>Although not required we encourage students to participate in “Expanding Horizons”, serve as student representatives on various committees and participate in the student organized graduate journal clubs.</p>	<p>Successful research project design and management.</p> <p>Successful presentation of research results and interpretation.</p> <p>Appropriate supervision of undergraduate 499 and BCHM project students.</p>	<p>-Accept responsibility</p> <p>-Self confidence</p> <p>-Decisive</p> <p>-Active engagement</p> <p>-Self-motivated</p>

	ethical principles and practices so that they can make sound decisions and judgment with respect to academic integrity and the responsible conduct of research. Graduating students will also have the ability to appreciate the broader implications of applying knowledge to new contexts.			
<i>Awareness of Limits of knowledge</i>	Graduating PhD students will demonstrate an understanding of the assumptions upon which their research is based, the limitations of their research methods and possibility of alternative interpretations of their results. Graduating students will also demonstrate an awareness that science, while in principle a simple act of pursuing fact, is in reality far more complex and subject to the pitfalls of any process involving human judgement. Graduating students will have the ability to accept and act on constructive criticism.	Seminar presentation and mentoring by thesis supervisor, colleagues and other faculty members. Mandatory PhD comprehensive examination. PhD thesis research and defense.	Reasoned response to questioning during presentations (including exit seminar) and the PhD comprehensive examination that demonstrate a knowledge and understanding of research limitations and of the potential contributions of other interpretations, methods, and disciplines.	-Desire to learn and improve -Understand the big picture

* Articulate degree level expectations that are unique to the degree program. For programs that are also part of a collaborative program, specific DLEs must be added.

** General learning outcomes associated with Master's and doctoral degree level expectations can be found on the attached pages. Please use these as guidelines; programs should define their own learning outcomes.

Resources on Degree Level Expectations and Learning Outcomes can be found at: <http://www.queensu.ca/sgs/faculty-staff/quality-assurance> or speak with your SGS Associate Dean (Kim McAuley: mcauleyk@queensu.ca; Sandra den Otter: denotter@queensu.ca)