

Department/Academic Unit: Pathology and Molecular Medicine

Degree Program: PhD

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

Expectations (general descriptors from OCAV)	Learning Outcomes This degree is awarded to students who demonstrate...	Indicators of Achievement As evidenced by...	Relevant Courses and academic requirements (requirements that contribute to the achievement of learning outcomes and degree expectations)	Transferable skills (skills acquired that are relevant and applicable to multiple career paths)
Depth and breadth of knowledge	<p>A thorough command of knowledge in the field of biomedical research focused on molecular, genetic and biological bases of human diseases with particular emphasis on cancer biology, genetics, vascular biology, cardiovascular disease and hemostasis.</p> <p>A critical understanding of current and developing approaches that inform clinical practise and development of improved methods of diagnosis and treatment including the trend toward “patient-tailored” treatment informed by molecular diagnostics.</p> <p>A detailed understanding of multiple molecular “omic” platforms (eg. genomic, epigenomic , proteomic)</p>	<p>Successful completion of 2.0 credits worth of course work.</p> <p>Writing and successfully defending a PhD thesis.</p> <p>Competing successfully for external scholarship awards.</p> <p>Presentation of research findings at local, national and international scientific conferences.</p> <p>Publication of research findings in peer-reviewed scientific journals.</p>	<p>2.0 credits are required for the PhD degree (unless previously done at MSc or Mini-Master level):</p> <p>Mandatory courses: PATH827 – Research Project in Pathology (0.5 credit)</p> <p>PATH930 – Pathology and Molecular Medicine Research Seminar Series (0.5 credit)</p> <p>QACS799 – Introduction to Animal Care – mandatory for students conducting research involving animals (non-credit)</p> <p>SGS804 – Human Research Ethics (CORE) - mandatory online course for students conducting research involving human subjects (non-credit)</p>	<p>Written and oral communication skills.</p> <p>Ethical use of animals in research.</p> <p>Ethics of clinical trials.</p>

	<p>used in current approaches of disease diagnosis; and the use of systems biology and mathematical modeling approaches of analyzing large data sets from these platforms to develop novel hypotheses about the molecular basis of disease and novel therapeutic strategies.</p> <p>Detailed knowledge of how clinical trials are developed and implemented.</p> <p>Detailed understanding and appreciation of the use of trans-disciplinary research approaches.</p> <p>A full appreciation of the complexities associated with research knowledge translation into improved clinical practice.</p>		<p>Elective courses: PATH822 - Experimental Cancer Therapeutics (0.5 credit)</p> <p>PATH823 – Cancer Biology (0.5 credit)</p> <p>PATH826 – The Molecular Basis of Disease (0.5 credit)</p> <p>Elective courses from other departments may also be taken, depending upon student research interests and specifically required skill sets associated with individual research projects.</p>	<p>Rationale for development of novel therapeutics, including preclinical trials to identify and validate therapeutic targets, and determine mechanism of action of novel therapeutic agents.</p>
<p>Research and scholarship</p>	<p>A thorough understanding and demonstrated methodological competence of how established techniques of research and are used to create and</p>	<p>Incorporation of positive feedback from supervisor regarding hypothesis and experimental approaches/results during regular lab meetings or</p>	<p>Essays summarizing key research studies in their field of study, written research proposal and presentation to and defense of that proposal with supervisory committee</p>	

	<p>interpret knowledge in the discipline. This may involve the development of novel techniques of research.</p> <p>The development of well supported hypotheses and experimental approaches; and presentation of research findings in written and oral forms.</p> <p>Requires the ability to critically evaluate research and scholarship in the discipline or area of professional competence.</p> <p>Enables a treatment of complex issues and judgements based on established principles and techniques.</p>	<p>one-on-one meetings to refine approaches.</p> <p>Incorporation of positive feedback from faculty and trainees during question periods at regularly scheduled departmental seminar presentations to refine approaches and presentations.</p> <p>Evidence of original and critical thinking to design experiments which challenge existing models in the context of research presentations.</p> <p>Demonstrated ability to incorporate new experimental observations into refined models.</p>	<p>in context of PATH827 course.</p> <p>Written research proposal and presentation and defense of same to examining committee in context of PhD comprehensive exam.</p> <p>Writing and defense of PhD thesis.</p> <p>Writing and submission of manuscripts for peer-reviewed publications.</p> <p>Preparation of seminars and posters for presentations at scientific meetings in local, national and international venues.</p> <p>Presentations and participation at journal clubs.</p>	<p>Oral and written communication skills, including “thinking on your feet” to explain and defend complex ideas.</p> <p>Development of comprehensive documents in support of applications for funding.</p>
Application of Knowledge	<p>Competence in the research process by applying existing methods or developing novel methods to generate, analyze and interpret data leading to new understandings of biological mechanisms of disease.</p>	<p>Demonstrated competence and expertise in current experimental methods and development and integration of new approaches to address questions and problems</p>	<p>PATH830; PATH827</p>	<p>Exposure to rapidly developing technology with opportunities to master and apply these methods.</p>

		about disease diagnosis and treatment.		
Professional capacity/autonomy	<p>Qualities and transferable skills necessary for employment training.</p> <p>Exercise of initiative and of personal responsibility and accountability, and decision-making in complex situations.</p> <p>The intellectual interest required for continuing professional development.</p> <p>The ethical behaviour consistent with academic integrity and the use of appropriate guidelines and procedures for responsible conduct of research.</p> <p>The ability to appreciate the broader implications of applying knowledge to particular contexts.</p>	<p>Demonstration of critical thinking, independent inquiry and rational arguments in the context of supervisory committee meetings, departmental seminars and research proposal and thesis defenses.</p> <p>Demonstrated ethical behavior consistent with academic integrity and appropriate for the responsible conduct of research in the context of course work and thesis research activities.</p>	<p>PATH827 – Research Project in Pathology -</p> <p>PATH830 – Pathology and Molecular Medicine Research Seminar Series –</p> <p>PATH822 - Experimental Cancer Therapeutics</p> <p>PATH823 – Cancer Biology</p> <p>PATH826 – The Molecular Basis of Disease</p> <p>QACS799 – Introduction to Animal Care</p> <p>SGS804 – Human Research Ethics (CORE) - mandatory online course for students conducting research involving human subjects</p>	<p>Development of self confidence in ability to learn and effectively apply complex experimental methods.</p> <p>Ability to assess the state of knowledge in a particular field and determine the potential of novel findings for practical applications.</p>
Communication Skills	The ability to communicate information and ideas clearly and concisely in both written and oral formats; including professional level oral and written presentations with informative visual content.	Incorporation of positive feedback from supervisory committee members during regularly scheduled progress report presentations and departmental seminars to refine and improve	<p>Departmental seminars; supervisory committee presentations; research proposal and thesis defenses; data presentations at scientific meetings.</p> <p>PATH830; PATH827</p>	Oral and written communication skills.

		communication skills.		
Awareness of limits of knowledge	Recognition and appreciation of the complexity of knowledge and of the potential contributions of other interpretations, methods, and disciplines.	Demonstration of critical thinking in the context of presentations and research results and discussion/defense of interpretations and conclusions.	Mentoring by supervisor, other faculty, staff and other trainees. PATH830; PATH827	Ability to think critically about research findings and consider potential applications of knowledge.