

**Department/Academic Unit: The Robert M. Buchan Department of Mining**

**Degree Program: Ph.D.**

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

| <b>Expectations</b> (general descriptors from OCAV) | <b>Learning Outcomes</b> (program specific)**<br>This degree is awarded to students who demonstrate...   | <b>Indicators of Achievement</b><br>As evidenced by...  | <b>Relevant Courses and academic requirements</b><br>(requirements that contribute to the achievement of learning outcomes and degree expectations)   |
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| Depth and breadth of knowledge                      | A thorough understanding of a substantial body of knowledge in various mining engineering fields, and specific to that field of this discipline on which his/her research efforts are focused, that is at the forefront of their academic discipline or area of professional practice  | Achievement of satisfactory academic performance through course submissions and examinations, completion of all levels of comprehensive examination and successful completion of academic courses that focus on the student’s principal area of research. Performance goals focus upon benefits of dissemination of information using unique and innovative problem solving techniques that can be creatively applied and effectively communicated. | Courses for this degree level are expected to have a specific focus on a range of mining engineering topics that are germane to the student’s research goals, and which may therefore assist in achieving and complementing research direction. In the current program listings, participants are recommended to take specific courses having topical academic content appropriate to his/her research program. |
| Research and scholarship                            | a. The ability to conceptualize, design and implement research for the generation of new knowledge, applications or understanding at the forefront of the discipline, and to adjust the research design or methodology in the light of unforeseen problems<br>b. The ability to make informed judgments on complex issues in specialist fields, sometimes requiring new methods; and<br>c. The | Adequacy in meeting timeline commitments for course-based assignments in all forms, and provide evidence of competence in ability to plan and efficiently manage research project or assignment submissions;<br>Demonstration of a capacity to provide a high level of accomplishment for academic tasks and reporting through regular and  | All graduate level courses offered by this Department, and other disciplines, are acceptable for Ph.D. program delivery.<br>The current academic offerings provide comprehensive training in all principal fields of discipline-related engineering, including mining (surface and underground), mineral processing and mine-mechanical fields that are considered to be principal attributes for professional  |

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|                                | ability to produce original research, or other advanced scholarship, or a quality to satisfy peer review and to merit publication  | effective communication with academic advisors  | and academic development in mining engineering.  |
| Application of Knowledge       | The capacity to:<br>i. Undertake pure and/or applied research at an advanced level; and<br>ii. Contribute to the development of academic or professional skills, techniques, tools, practices, ideas, theories, approaches, and/or materials development   | Achievement of proficiency and efficiency in the planning and distribution of scientific knowledge for discipline specific assignments. Candidates must demonstrate the ability to adhere to strict time requirements in assigned tasks within courses, to achieve research milestone goals, to show evidence of contingency planning capability and to demonstrate regular and effective communication with faculty and peers  | Academic offerings provided by the Mining Department provide strong overlap with related disciplines such as Geological, Civil, Mechanical and Chemical Engineering. The program encourages students in the Ph.D. program to participate in academic courses within other such units (up to proscribed limits in number), and to both consolidate and effectively participate with other academic units as time and timetabling permit. Research knowledge obtained is shared with others by way of MINE897. |
| Professional capacity/autonomy | a) The qualities and transferable skills necessary for employment requiring the exercise of personal responsibility and largely autonomous initiative in complex situations;<br><br>b) the intellectual independence to be academically and professionally engaged and current;<br><br>c) the ethical behaviour consistent with academic integrity and the use of appropriate guidelines and procedures for responsible conduct of research; and | -Ability to meet all academic deadlines in timely and proactive fashion by being punctual in all aspects and demonstrating willingness to meet timelines set<br>-Effectively seek additional meetings with academic and/or technical staff to develop organizational or task goals, particularly for research activities<br>-Capability to provide reasoned analyses of societal and ecological factors, with risks mitigated where possible; strong focus and inclusion of discipline-related information in achieving project-related goals | The combination of a wide variety of academic course offerings, access to highly skilled and trained professional engineering staff and capability of graduate programs to overlap between related disciplines offers considerable opportunity for students to excel in their academic pursuits  |

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|                                  | d) the ability to evaluate the broader implications of applying knowledge to particular contexts   |  |  |
| Communication Skills             | The ability to communicate complex and/or ambiguous ideas, issues and conclusions clearly and effectively in all standard forms of communications both orally and in written form        | <ul style="list-style-type: none"> <li>-Highly motivated preparation and research design skills to be displayed as well as evidence of effective skill at organizing assignment and course deliverables, research planning activity and delivery of research output</li> <li>-Excellent oral delivery capability to be shown for in-class and research presentation activities (through seminar discussions or planned presentations); effective use made of figures, graphs and illustrations to enhance written presentations</li> </ul> | All academic courses, including the mandatory Seminar delivery course (MINE 897) and other planned research presentation efforts, promote development of strong communication skills in oral and written/computer media  |
| Awareness of limits of knowledge | An appreciation of the limitations of one's own work and discipline, of the complexity of knowledge and of the potential contributions of other interpretations, methods and disciplines | <ul style="list-style-type: none"> <li>-Ability to make effective use of information gathered from others and making full and concise attributions to the contributions of others</li> <li>-Recognition of missing or unidentified information and apparent gaps in information databases</li> <li>-Capacity to seek assistance of others in the same field or to seek information sources beyond</li> </ul>   | Ph.D. students are encouraged to disseminate their research to others within the discipline through journal publications and conference attendance. Their own research findings and that of other students will provide additional learning experience by such knowledge transmission. |

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|   |   | the current scope of discipline knowledge when and if required  |   |
| <i>Add program specific degree expectation*</i> | The learning outcomes of the Ph.D. program of study in Mining are similar to those of most other engineering disciplines at Queen's University, and based largely on academic course instruction in a minimum inventory of courses as set by this Department (4). | One program specific requirement is that all Ph.D. students registered full-time and resident on campus must participate in and present oral contributions annually to fulfill and enhance their communication skill set. | MINE 897 (Seminar) is mandatory for all Ph.D. students. |
| <i>Add program specific degree expectation</i>  |   |   |   |

\* 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.