UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING

Report No: 3281

To: **Faculty Council**

From: **Professor Chris Damaren**
Chair, Engineering Graduate Education and Research Committee

Date: **February 7, 2011 for March 8, 2011 Meeting**

Item: **Graduate Degree Level Expectations**

Background:

The following two paragraphs are taken from the **Quality Assurance Framework** created by the Ontario Universities Council on Quality Assurance and approved by the Ontario Council of Academic Vice-Presidents (OCAV).

> Quality assurance of university academic programs has been adopted around the world and is widely recognized as a vital component of every viable educational system. Considerable international experimentation in the development of quality assurance processes, along with increasing pressure for greater public accountability, has raised the bar for articulating Degree Level Expectations and learning outcomes in postsecondary education.
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> **Degree Level Expectations**: The Degree Level Expectations established by OCAV serve as Ontario universities' academic standards and identify the knowledge and skill outcome competencies that reflect progressive levels of intellectual and creative development. They may be expressed in subject-specific or in generic terms. Graduates at specified degree levels (e.g., BA, MSc) are expected to demonstrate these competencies. Each university has undertaken to adapt and describe the degree level expectations that will apply within its own institution. Likewise, academic units will describe their institution's expectations in terms appropriate to its academic program(s).

The following paragraph is taken from the **University of Toronto Quality Assurance Process (UTQAP)**:

> The University of Toronto is committed "to being an internationally significant research university, with undergraduate, graduate, and professional programs of excellent quality." Hence, the University welcomes the opportunity provided by the Ontario Council of Academic Vice-Presidents' *Quality Assurance Framework* (QAF) assigning the responsibility for academic standards, quality assurance and program improvement, in the first instance, to universities themselves. The University of Toronto's approach is built on

two primary indicators of academic excellence: (1) the quality of the scholarship and research of faculty and (2) the success with which that scholarship and research is brought to bear on the achievement of Degree Level Expectations. These indicators are assessed by determining how our scholarship, research and programs compare to those of our international peer institutions and how well our programs meet their Degree Level Expectations.

Consultations:

The degree level expectations (DLEs) which follow were drafted starting with those established by OCAV in the *Quality Assurance Framework* document. They have been reviewed by and received input from the following groups within the Faculty of Applied Science and Engineering: Faculty Graduate Coordinators, the Engineering Graduate Education and Research Committee, the Graduate Attributes Committee, and Chairs and Directors. In addition, the Vice-Provost, Academic Programs, has reviewed them.

Proposal/Motion:

THAT the Faculty of Applied Science and Engineering adopt the attached Degree Level Expectations for the following graduate programs: Master of Applied Science, Master of Engineering, and Doctor of Philosophy.

Degree Level Expectations for the Master of Applied Science

This degree is awarded to students who have demonstrated the following:

1. Depth and Breadth of Knowledge

A systematic understanding of engineering and applied science knowledge including, where appropriate, relevant knowledge outside the field and engineering discipline, and a critical awareness of current problems and/or new insights, much of which is at, or informed by, the forefront of their engineering or applied science discipline.

2. Research and Scholarship

A conceptual understanding and methodological competence that

(a) Enables a working comprehension of how established techniques of research and inquiry are used to create and interpret knowledge in the discipline;

(b) Enables a critical evaluation of current research and advanced research and scholarship in the discipline;

(c) Enables a treatment of complex issues and judgments based on established principles and techniques;
And

On the basis of that competence, has shown both of the following:

(d) The development and support of a sustained argument in written form; and

(e) Originality in the application of engineering or applied science knowledge.

3. Level of Application of Knowledge

(a) Competence in the research process by applying an existing body of knowledge in the critical analysis of a new question or of a specific problem or issue in a new setting; and

(b) The ability to exercise leadership in research innovation.

4. Professional Capacity/Autonomy

(a) The qualities and transferable skills necessary for employment requiring:
    (i) The exercise of initiative and of personal responsibility and accountability; and
    (ii) Decision-making in complex situations;

(b) The intellectual independence required for continuing professional development including the ability for self-directed life-long learning;

(c) The ethical behaviour consistent with academic integrity and the use of appropriate guidelines and procedures for responsible conduct of research; and

(d) The ability to appreciate the broader implications of applying knowledge to particular context.

5. Level of Communications Skills

The ability to communicate ideas, issues, and conclusions clearly in oral and written form.

6. Awareness of the Limits of Knowledge

Cognizance of the complexity of knowledge, its underlying assumptions, and the potential contributions of other interpretations, methods, and disciplines.

Degree Level Expectations for the Master of Engineering

This degree is awarded to students who have demonstrated the following:

1. Depth and Breadth of Knowledge

A systematic understanding of engineering and applied science knowledge including, where appropriate, relevant knowledge outside the field and engineering discipline, and a critical awareness of current problems and/or new insights, much of which is at, or informed by, the forefront of their engineering or applied science discipline.

2. Knowledge of Methodologies

A conceptual understanding and methodological competence that

(a) Enables a working comprehension of how established techniques of inquiry are used to interpret knowledge in the discipline;

(b) Enables a critical evaluation of current developments in the discipline;

(c) Enables a treatment of technical issues and judgments based on established principles and techniques.

3. Level of Application of Knowledge
Competence in the application of an existing body of data in the critical analysis of advanced problems or issues. Here, advanced indicates a difficulty level beyond that encountered at the undergraduate level.

4. Professional Capacity/Autonomy
(a) The qualities and transferable skills necessary for employment requiring:
    (i) The exercise of initiative and of personal responsibility and accountability; and
    (ii) Decision-making in complex situations;
(b) The intellectual independence required for continuing professional development;

(c) The ethical behaviour consistent with academic integrity and the use of appropriate guidelines and procedures for responsible conduct in a professional context; and

(d) The ability to participate meaningfully as leaders in society.

5. Level of Communications Skills
The ability to communicate ideas, issues, and conclusions clearly in oral and written form. This includes being capable of constructing a credible argument and presenting it in appropriate formats.

6. Awareness of the Limits of Knowledge
Cognizance of the complexity of knowledge, its underlying assumptions, and the potential contributions of other interpretations, methods, and disciplines.

Degree Level Expectations for the Doctor of Philosophy

This degree extends the skills associated with the Master of Applied Science degree and is awarded to students who have demonstrated the following:

1. Depth and Breadth of Knowledge
A thorough understanding of a substantial body of engineering or applied science knowledge that is at the forefront of their engineering or applied science discipline including, where appropriate, relevant knowledge outside the field.

2. 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 light of unforeseen problems;

(b) The ability to make informed judgments on complex issues in specialist fields, sometimes requiring new methods; and

(c) The ability to produce original research, or other advanced scholarship, of quality to satisfy peer review, and to merit publication.

3. Level of Application of Knowledge
The capacity to
(a) Undertake pure and/or applied research at an advanced level;

(b) Contribute to the development of academic or professional skills, techniques, tools, practices, ideas, theories, approaches, and/or materials; and

(c) Exercise leadership in research innovation.

4. 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;

(b) The intellectual independence to be academically and professionally engaged and current;

(c) The ethical behaviour consistent with academic integrity and the use of appropriate guidelines and procedures for responsible conduct of research; and

(d) The ability to evaluate the broader implications of applying knowledge to particular contexts.

5. Level of Communications Skills
The ability to communicate complex and/or ambiguous ideas, issues, and conclusions clearly and effectively in oral and written form.

6. Awareness of the 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.