

FINAL ASSESSMENT REPORT & IMPLEMENTATION PLAN
MSc and PhD in MATERIALS SCIENCE
Dated April 3 – For Posting

Degree Programs Being Reviewed	MSc Materials Sciences PhD Materials Sciences
Review Committee	External Reviewers <ul style="list-style-type: none"> • Dr. Ricardo Aroca, Windsor University • Dr. Maureen Reedyk, Brock University • Dr. Mihai Scarlete, Bishop’s University Internal Representative <ul style="list-style-type: none"> • Dr. Kenzu Abdella, Trent University
Year of Review	2015-2016
Date of Site Visit	October 14-15, 2015
Due Date for Implementation Report by Materials Science	November 1, 2017
Date of Next Cyclical Review	2023-2024
Draft FAR Prepared by Trent’s CPRC Draft FAR Reviewed and Revised by UOIT’s GSC Date FAR Accepted by Trent and UOIT	November 2, 2016 February 28, 2017 March 24, 2017
UOIT – Date of Approval by Senate	
Trent – Date of Approval by Provost & VP Academic with signature	
Trent – Senate for Information	May 2, 2017

Trent University and The University of Ontario Institute of Technology (UOIT) launched the joint MSc in Materials Science program in 2007. In 2011, the program was expanded to include a PhD in Materials Science. The MSc and PhD programs are multi-disciplinary in scope, and are comprised of coursework and a research thesis under the supervision of a research supervisor and a supervisory committee. Both programs are jointly offered between the two institutions, utilizing video conference technology to provide courses and to facilitate supervisory committee meetings and defenses. Faculty from both institutions are involved in each student's supervisory committee to provide breadth and access to a wide range of expertise in this interdisciplinary program.

Materials Sciences is a broad multidisciplinary area of science that lies at the intersection of physics and chemistry. The program includes the following fields: Materials Chemistry, Materials Physics, Biomaterials, and Theoretical & Computational Materials Science. As well, it comprises many subfields including nanotechnology, electronic materials, surface science, biomaterials and materials characterization.

As the reviewers' note, 'The strength of the Materials Science program arises from the joint effort of UOIT and Trent Universities, and these two components are essential for the existence and future success of the program.

The Cyclical Program Review Committee (CPR) and Graduate Studies Committee (GSC) concluded that the MSc and PhD in Materials Science programs are both of Good Quality.

SUMMARY OF PROCESS

During the 2015-2016 academic year, the MSc and PhD in Materials Science underwent a review. Three arm's-length external reviewers (Dr. Ricardo Aroca, Windsor University; Dr. Maureen Reedyk, Brock University; Dr. Mihai Scarlete, Bishop's University) and one internal member (Dr. Kenzu Abdella, Trent University) were invited to review the self-study documentation and then conducted a site visit to the university on October 14-15, 2015.

This Final Assessment Report (FAR), in accordance with both Trent and UOIT's Institutional Quality Assurance Policies, provides a synthesis of the cyclical review of the undergraduate degree programs. The report considers three evaluation documents: the Program's Self-Study, the External Reviewers' Report, the Response to the External Reviewers Report.

A summary of the review process is as follows. Trent University and UOIT worked together to propose a pathway for the cyclical review of the MSc and PhD degree programs in Materials Science. The Self-Study and Appendices were a collaborative effort and were approved by both institutions prior to forwarding to the Review Committee. The Self-Study addressed all components of the evaluation criteria as outlined in the Quality Assurance Framework. Appendices included: Library Report, Course Outlines, and CVs. Learning Outcomes and relevant data tables were incorporated in the Self-Study document.

Qualified External Reviewers were invited by Trent and UOIT (a single invitation) to conduct a review of the MSc and PhD degree programs. External reviewers reviewed all relevant documentation in advance of a site visit to both Trent and UOIT. An internal faculty member from Trent participated in the site visits. During the site visit, the Review Committee met with senior administrators, faculty, and students; toured facilities, and visited a lecture being conducted by videoconference. Once the external reviewers' report was received, Trent and UOIT provided a program response and a decanal response. It was agreed that Trent University would take the lead on preparing a draft Final Assessment Report that would be reviewed and edited by UOIT. The Final Assessment Report would be subject to approval according to each university's approval processes, and then would be submitted to Quality Council.

Trent's Cyclical Program Review Committee (CPRC) reviewed and assessed the quality of the degree programs based on the four review documents and reported on significant program strengths, opportunities for improvement and enhancement, and the implementation of recommendations. The documentation was also reviewed by the Graduate Studies Committee of Academic Council at UOIT.

The Implementation Plan identifies those recommendations selected for implementation, and specifies: proposed follow-up, who is responsible for leading the follow-up, and the specific timeline for addressing individual recommendations (if applicable). Trent and UOIT would be responsible for submitting an Implementation Report in response to the recommendations identified for follow-up. Report is due November 1, 2017.

SIGNIFICANT PROGRAM STRENGTHS

- The Programs draw upon the strengths of the universities, environment at Trent and manufacturing focus at UOIT.
- The Program is unique in that it focuses more on science than technology or engineering.
- The collaborative aspect and synergy between the two universities allow students to meet the learning outcome requirements.
- Previous course work and/or practical experience is recognized and course load is adapted to provide credit to students.
- Videoconferencing is an integral part of the program.
- The Program is committed to developing the professional communication skills of its students.
- Strong culture of collaboration among students and faculties.
- A low student/faculty ratio allows for healthy and frequent interactions between students and faculty.

OPPORTUNITIES FOR PROGRAM IMPROVEMENT AND ENHANCEMENT

- The addition of a mathematics admission requirement could provide students with the necessary background for the MTSC 6010 course.
- The Program should maintain contact with alumni.
- Greater availability of video conference facilities will improve student-faculty interactions during courses and also better enable other joint activities throughout the program.

COMPLETE LIST OF RECOMMENDATIONS

RECOMMENDATION 1

That the program adapt as the field evolves and make certain that the sub-disciplines remain cohesive. (eg. Biomaterials)

Program Response

The Program indicated that this is a challenge unique to an interdisciplinary program such as Materials Science. The Program is currently providing an effective survey of select topics in the broad field of Materials Science. The program will need to consider the addition of faculty as new areas emerge, specifically in organic materials chemistry at Trent, and in experimental physics for UOIT. Faculty at each institution will continue to find areas of collaborative research. Future additions to faculty will be particularly targeted to provide bridging or complementary research interests.

Decanal Response

Both Trent and UOIT will continue to ensure that faculty resources are adequate to sustain the program and will seek opportunities to advocate for funding for an organic physicist and chemist.

RECOMMENDATION 2

That Materials Science graduate program be specifically included in strategic planning at both universities, in order to increase visibility.

Program Response

The program is keen to participate in a unified effort to better establish Materials Science as a strategic research area at both UOIT and Trent.

Decanal Response

The two institutions can only benefit from any efforts to increase the visibility of the program. UOIT is currently doing a refresh of the strategic research plan which will include materials science.

RECOMMENDATION 3

- a) **That the current expertise in the chemistry/physics of biodegradable materials be developed; greatest need for Trent is in organic chemistry and at UOIT it is experimental physics.**
- b) **That course offerings be planned at least one year in advance to facilitate course selection for students and that a predictable pattern of course offerings be established.**
- c) **That a formal agreement concerning the number of courses offered at each institution each year be determined.**
- d) **That course offerings be taught on load if possible.**

Program Response

Additional faculty in the areas identified by the external reviewers is a top priority for the program and efforts are on-going to obtain those resources in consultation and collaboration with the associated undergraduate programs in chemistry and physics.

The reviewers are correct in identifying a need for longer term planning of course offerings and a regularization of the institutional commitments to provide courses. As the program has evolved, subtle changes to the course content and instructional methods have occurred. A renewal of the expectations from each institution and faculty members is appropriate.

Decanal Response

As noted the decanal response to Recommendation #1, both Trent and UOIT will continue to ensure that faculty resources are adequate to sustain the program. It is important for graduate programs to plan out course offerings well in advance. At Trent and UOIT, there is compensation for teaching, but the number of courses that can be offered in a given year is limited. Planning for course offerings is now being conducted over a two to three year period.

RECOMMENDATION 4

- a) Improved access to online resources in the libraries.**
- b) Encourage more generous foreign student fee waivers**
- c) Creation of a Materials Characterization Laboratory for hands-on experience in areas of research and teaching.**

Program Response

Institutional funding is an on-going challenge specifically for library resources and international fee waivers. The University continues to maintain an effective balance between domestic and international students to allow for a robust and well recognized program both within Canada and internationally. The Program will re-examine possibilities of establishing a lab such as this, as it would be valuable to students in both their course work and research.

Decanal Response

The Deans commented that the initiative is an excellent idea and they look forward to program documentation supporting the request. More information will be required about the necessary steps to develop the lab. Both Universities commented that there are a limited number of graduate international tuition scholarships available.

RECOMMENDATION 5

- a) Contact graduates and begin building a community of its Alumni.**
- b) Greater presence at graduate fairs and undergraduate conferences to increase recruitment efforts.**

- c) **To grow enrolment in the MSc program, provide student funding that is competitive in the Ontario market.**

Program Response

- Materials Science will coordinate contacting alumni through the alumni offices at each institution to engage them in various means of supporting the program. Alumni are enthusiastic about helping the program grow and thrive.
- Materials Science annually participates in recruitment events at the Canadian Undergraduate Physics Conference and the Ontario Undergraduate Student Chemistry Conference as well as the Chemistry Graduate Information Session. Materials Science will develop a strategy for broadening its recruitment.
- It should be noted that as faculty typically provide research funding to support their graduate students, total program enrollments are restricted by the number of faculty members in the program. The addition of faculty members to the program would provide increased capacity for graduate students in the program.

Decanal Response

At Trent, efforts have been made in the last year to update recruitment materials. At UOIT, the recruitment budget is program-specific and is a shared cost. In 2016-2017, UOIT will be producing uniform recruitment materials for all graduate programs.

RECOMMENDATION 6

That program meetings between faculties be regularly scheduled.

Program Response

The program intends to re-establish regular program meetings this spring. Materials Science will also renew its commitment to hosting faculty from either institution to encourage and support research collaborations. Access to video conferencing facilities at UOIT is a critical issue for the Material Science program as they require time for scheduling classes and 'program meeting' for steering committees, as well as supervisory committee meetings and thesis defenses which are not fixed times like lectures. One of the three synergy rooms should be prioritized to the Materials Science program, for the following needs: course delivery, office hours, steering committee meetings.

Decanal Response

The Deans support this initiative. This is part of the role of the Directors and should be communicated in appointment letters.

IMPLEMENTATION PLAN

The applicable Deans, in consultation with the Department Chairs/Directors of the relevant Academic Units shall be responsible for monitoring the Implementation Plan. The Reporting Date for submitting a follow-up Implementation Report is indicated below and is the responsibility of the Academic Units in consultation with the Deans.

DUE DATE FOR IMPLEMENTATION REPORT: November 1, 2017

The Implementation Report should be submitted to the applicable Deans who will then forward the Report to the Office of the Provost.

Recommendation	Proposed Follow-Up If no follow-up is recommended, please clearly indicate ' <u>No follow up report is required</u> ' and provide rationale. <i>Indicate specific timeline for completion or addressing recommendation if different than Due Date for Implementation Report</i>	Position Responsible for Leading Follow-up
<u>Recommendation 1</u> That the program adapt as the field evolves and make certain that the sub-disciplines remain cohesive. (eg. Biomaterials)	Program should evaluate the connection between Physicists and Organic Chemists	Directors
<u>Recommendation 2</u> That Materials Science graduate program be specifically included in strategic planning at both universities, in order to increase visibility.	No follow-up required. This does not appear to be a significant quality issue	
<u>Recommendation 3</u> <ul style="list-style-type: none"> • That the current expertise in the chemistry/physics of biodegradable materials be developed; greatest need for Trent is in organic chemistry and at UOIT it is experimental physics. • That course offerings be planned at least one year in advance to facilitate course selection for students and that a predictable pattern of course offerings be established. 	This is a faculty resource issue. Update should be provided; comment on actions taken. Should be in place for the 2017-2018 Academic Year	Deans with Directors Directors

<ul style="list-style-type: none"> • That a formal agreement concerning the number of courses offered at each institution each year be determined. • That course offerings be taught on load if possible. 	<p>Formal agreement is needed. Should be in place for the 2017-2018 Academic Year</p> <p>No follow-up is required. This has been implemented.</p>	<p>Deans with Directors</p>
<p><u>Recommendation 4</u></p> <ul style="list-style-type: none"> • Improved access to online resources in the libraries. • Encourage more generous foreign student fee waivers • Creation of a Materials Characterization Laboratory for hands-on experience in areas of research and teaching. 	<p>Program should provide update.</p> <p>No follow-up required. This does not have a significant impact on program quality.</p> <p>Provide update. This type of laboratory may be utilized by a number of programs.</p>	<p>Directors with Librarians</p> <p>Directors and Deans with VPs of Research</p>
<p><u>Recommendation 5</u></p> <ul style="list-style-type: none"> • Contact graduates and begin building a community of its Alumni. • Greater presence at graduate fairs and undergraduate conferences to increase recruitment efforts. • To grow enrolment in the MSc program, provide student funding that is competitive in the Ontario market. 	<p>No follow-up required. This does not have a significant impact on program quality.</p> <p>No follow-up is required. This does not have a significant impact on program quality.</p> <p>No follow-up required. This does not have a significant impact on program quality.</p>	
<p><u>Recommendation 6</u></p> <p>That program meetings between faculties be regularly scheduled.</p>	<p>No follow up required. Regular meeting has been reinstated for the 2016-2017 academic year, and will include Directors and a faculty representative from each institution.</p>	