

FINAL ASSESSMENT REPORT

PERIODIC PROGRAM REVIEW (PPR)

Bachelor of Science (Honours)

Medical Physics

Faculty of Science

In accordance with the Institutional Quality Assurance Process (IQAP), this final assessment report provides a synthesis of the external evaluation and the internal response and assessments of the undergraduate Medical Physics Program. This report identifies the strengths of the program, together with opportunities for program improvements and enhancements, and it sets out and prioritizes the recommendations that have been selected for implementation.

This report also includes an Implementation Plan that identifies who will be responsible for approving the recommendations set out in the final assessment report; who will be responsible for providing any resources entailed by those recommendations; any changes in organization, policy, or governance that will be necessary to meet the recommendations, who will be responsible for leading those recommendations; and timelines for acting on and monitoring the implementation of those recommendations.

SUMMARY OF THE PERIODIC PROGRAM REVIEW OF MEDICAL PHYSICS

The B.Sc. (Hons) in Medical Physics has a modern curriculum that offers three main academic streams: Medical Physics, Computational Physics, and Physics.

As in all contemporary studies, the Undergraduate Program in Medical Physics no longer focuses solely on the classical aspects of Science but rather on the convergence of knowledge, methods and skills. The very nature of this applied, multidisciplinary Program emphasizes the development of skills that will equip students for the workforce in specific types of jobs supporting the fields of medicine and health care, or for post-graduate training and research. Toronto Metropolitan University (TMU) graduates pursuing further studies in this cutting-edge field use their specialized knowledge, technical skills and multidisciplinary training to make a meaningful difference in the medical and health care fields in areas including, but not limited to, as oncology and cancer treatment, radiation and health physics, and computational physics.

The Medical Physics Program is a full-time undergraduate program and consists of 40 one-semester or equivalent courses. The first year is common to the Biology and Chemistry programs and establishes the fundamentals of scientific knowledge. The first-year curriculum offers introductory-level courses in Physics (2), Mathematics (2), Biology (2), Chemistry (2) and Computer science (1), and also includes a pass/fail specialized orientation course (SCI 180), which equips the students with the skills to cope with the demands of university life. In the second year of study, the Medical Physics curriculum path separates from the other Science programs in order to begin focusing students' education on essential Physics areas (Electricity and Magnetism, Modern Physics, Quantum Mechanics, Mathematical Physics and Biophysics) as well as additional math courses. The second-year course "Introduction to Medical Physics" (PCS 229) exposes students to the multidisciplinary aspect of their Program for the first time. In the third year of study, the Program curriculum continues to focus on fundamental areas of Physics that are traditional to Physics and Medical Physics degrees, such as Nuclear Physics, Thermodynamics and Statistical Physics,

and Photonics. Additionally, the students are exposed to more specialized subjects, such as Medical Imaging, Cell Biology and Biostatistics that reflect the specific needs of the Program. Also, during the third year, students begin to select professionally-related elective courses to advance their knowledge in Physics and supporting disciplines of Medical Physics or other professional areas that they would like to pursue after graduation (a few examples are: medical school, health and radiation physics, computational physics, and data science). In the Program's fourth and final year, the students are exposed to specialized Medical Physics courses, more electives and liberal studies courses and work on a yearlong 4th-year medical physics research thesis project. The current curriculum also includes six liberal studies courses, mandatory in the University curriculum, spread over all Program years.

This document comprises The Faculty of Science's Dean's response to the Peer Review Team (PRT) Report and the School's response, in accordance with the directions of the 2018 and 2022 Periodic Program Review (PPR) Manual and with Section 8.2 of Senate Policy 126, Periodic Program Review of Graduate and Undergraduate Programs. The site visit by the external PRT for the Periodic Program Review was carried out between April 29-30, 2024. The School of Medical Physics submitted a list of potential Peer Review Team (PRT) candidates to the Office of the Dean, who then selected

Dr. Chitra Rangan, Professor & Graduate Program Coordinator, Department of Physics, University of Windsor, Canada

Dr. Marko Horbatsch, Professor, Department of Physics and Astronomy, York University, Canada

Overall, the PRT considers the B.Sc. Honours program in Medical Physics at TMU unique which is thriving and producing graduates who develop careers in a variety of fields related to human health. The multi-disciplinary curriculum is generally well-structured, and student and alumni satisfaction is high.

The department has a desire to expand training students in health physics/radiation sciences for whom there is great demand. The imminent opening of the TMU School of Medicine will provide exciting opportunities for collaboration.

The program has applied an Equity Diversity and Inclusion (EDI) lens to its recruitment and practices. The admission requirements (grade 12 physics not being required) has made it possible for students from schools where grade 12 physics is not offered to access a cutting-edge medical physics education. This increases opportunities for many students. The renovated laboratories are accessible to students with many disabilities, and course syllabi indicate the supports/accommodations available for students who need them. The reviewers note that the student body and faculty complement is very diverse both in ethnicity and gender. This partly reflects the diversity of the GTA region, but also the welcoming culture in the program. Students are also supported to participate in the Canadian Conference for Undergraduate Women in Physics. The Department supports Women in Physics initiatives as well. Students' comments on the culture in the program indicate that they have a supportive and inclusive environment

The PRT Report offered seven critical recommendations, and the School has responded thoughtfully to each to generate their Implementation Plan. The Dean's Office is in full support of the School's responses to the PRT recommendations.

The School of Medical Physics has submitted its response to the PRT report to the Dean of the Faculty of Science, to which the Dean responded on September 5, 2024.

The Academic Standards Committee completed its assessment of the School of Medical Physics on February 13, 2025. The Committee indicated that a thorough, analytical and self-critical program review was conducted. The program provided a detailed plan for future growth and support for development.

The Academic Standards Committee recommends that the program continue, as well as provide a one-year follow-up report as follows:

The mandated One-Year Follow-up Report be submitted by June 30, 2026 to include:

- 1. An update on the Implementation Plan**

Presented to Senate for Approval: March 25, 2025

Start date of next Periodic Program Review: 2029/30

SUMMARY OF THE REVIEWERS' RECOMMENDATIONS WITH THE PROGRAM'S AND DEAN'S RESPONSES

RECOMMENDATION ONE:

We recommend that the faculty complement remain at 18 full-time faculty members so that course delivery of core medical physics courses (such as radiation therapy or medical imaging) may be offered on a regular basis. We note that the vacancy created by the resignation of a faculty member is being filled by an ongoing search.

PROGRAM RESPONSE:

This is a valid and crucial recommendation in order to maintain the depth and breadth of the program and Departmental operation in all areas of teaching, SRC, and service, and be able to implement improvements outlined in the PPR self-study document and recommended by the PRT, such as the addition of a new career path in the program in Health Physics/Radiation Sciences, enhancing program's students success, and leveraging the potential synergies between the Department of Physics and the Medical Physics Program and the new MD program at TMU. To this end, we will be striving to fill in an open faculty position in the program with the expertise in Radiation Physics and Radiation Therapy as soon as possible.

DEAN'S RESPONSE:

The Dean is committed to supporting the Department of Physics in their ongoing search for a tenure stream faculty member.

RECOMMENDATION TWO:

We recommend that the program expand its core offerings in the third year to include courses in areas such as the 'physics of medical accelerators' and 'biomedical optics'. We note that the multidisciplinary program structure leaves no room in the curriculum for these courses. We suggest that since the program is already multidisciplinary, the students be allowed to reduce the number of LS electives to 4 to make room for these courses.

PROGRAM RESPONSE:

This is a valid recommendation and in line with the Program's PPR recommendations. The program's

curriculum could strongly benefit from the inclusion of the two suggested courses. Both courses could strengthen specialized Medical Physics core content. It is worth noting that the Program functions as a feeder to the CAMPEP-accredited Graduate Program run by the Department. The same issue was pointed out also in the report of one of the Program Advisory Committee Members. They noted that no comparator undergraduate programs in Medical Physics or related fields impose a requirement of such a high number of LS-type courses in their curricula. The program would like to request the support from offices of the Dean, Faculty of Science, and the Provost & Vice-President, Academic, toward implementing this recommendation.

DEAN'S RESPONSE:

The Liberal Studies content of Programs at TMU is defined in Senate Policy 2. Any exception that would take the number of Liberal Studies courses in the Medical Physics Program to less than 6 would require approval from the Academic Standards Committee and Senate, and should be based on the standards of professional accreditation for the undergraduate program. If the purpose of the proposed courses is only as preparation for applying to the graduate program, then the suggested courses could be added to the Core Electives Table for those students intending to apply to clinically accredited graduate programs.

RECOMMENDATION THREE:

We recommend that the program is provided with the support needed to continue offering excellent medical physics undergraduate training.

As outlined in Table 6.5 of the Self-Study, there is an urgent need to replace teaching equipment reaching their end of life. The first two line items in the Table are essential for offering the Nuclear Physics courses and will be key support if a health physics/radiation sciences stream is developed in the future.

The Virtual Reality lab is a unique feature of the program where undergraduate students are able to access clinical settings in the classroom that they otherwise would not have due to clearance restrictions. Currently, this feature is offered as a demonstration. To enable all students to have a hands-on experience, the requested VR lab set-ups will be a modest investment.

Page 51 of the Self-Study provides relevant cost details.

PROGRAM RESPONSE:

This is a supportive and valid recommendation and in line with the Program's PPR recommendations. The program would like to request for financial support from offices of the Dean, Faculty of Science, and the Provost & Vice-President, Academic, toward implementing this recommendation.

DEAN'S RESPONSE:

This recommendation represents a resource request that goes beyond the program review process. While the Dean's Office can work with the Department to identify possible initial funding sources for such infrastructure, ongoing costs for maintaining such teaching infrastructure should be incorporated into the Department's operating budget.

RECOMMENDATION FOUR:

We recommend that the department proceed with its plan to create a new stream (career path) in Health Physics/ Radiation Sciences. The need for professionals trained in this area is acute, and students will be able to enter the workforce directly after graduation. The TMU Department of Physics is uniquely

positioned to create such a program by leveraging the existing resources in its Medical Physics program.

PROGRAM RESPONSE:

This is a valid and crucial recommendation and fully in line with the Program's PPR recommendations and plans. Note that the new Health Physics/Radiation Sciences career path will be created within the Medical Physics Program to augment the existing three professional career paths.

DEAN'S RESPONSE:

The Dean supports this recommendation after a thorough needs assessment is done. The Department will need to assess whether Health Physics/Radiation Science is best included in their curriculum by creation of a Concentration or Optional Specialization in line with the Curriculum Structure described in Policy 2.

RECOMMENDATION FIVE:

We recommend that the program examine patterns of enrollment to determine why graduation times seem to extend beyond 4 years for many students. This would be particularly important for the recruitment of international students into the program.

PROGRAM RESPONSE:

This is a valid and important recommendation. The program has already started working on and addressing this issue and in the submitted PPR self-study, a set of recommendations were proposed focusing directly on this issue (Recommendations 1 to 4 in the PPR self-study document). Moreover, the implementation of the following recommendation made by the PRT (Recommendation 6) will further address this issue. Overall, the Program is fully committed to further enhance students' success in the Program.

DEAN'S RESPONSE:

The Dean's office can work with the Department to assess whether the existing pre-requisite structure within the physics program contributes to unnecessary delays in program completion. This should be done in tandem with a student and alumni survey to understand what non-academic factors, if any, had contributed to not meeting the 4-year graduation time.

RECOMMENDATION SIX:

The multidisciplinary nature of the program causes core electives to be offered from a variety of disciplines. We recommend that the program investigate ways of enhancing the advising experience for students to stream them into appropriate course selections. This time-intensive activity may be delivered with the help of the administrative staff as "first-responders". This may address partly the question of course availability and graduation times. For example, the Medical Physicists may be able to provide research opportunities for medical students. In the longer term, there may be an opportunity to create a Medical Physics residency at the medical school to provide opportunities for the graduates of the Medical Physics Masters/PhD program.

PROGRAM RESPONSE:

This is a valid recommendation that along with the previous recommendation aim to improve the Program's students' success. As mentioned above, the Program is well aware of this issue and through the current PPR will actively address it. It should be emphasized that, as recommended by the PRT, the availability of an administrative staff as a first responder, will greatly help the Program to enhance its students' advising methods/strategies and improve students' success in the Program.

The designated staff, typically at a departmental administrative level, will be trained by the program (the Chair, the Undergraduate Program Director, and the Staff Managers) to this end. Therefore, it is crucial for the Department of Physics to maintain its current level of administrative staff resources.

DEAN'S RESPONSE:

The Dean's Office recommends that the Department consider development of curriculum maps showing the developed stream that can be shared in the student handbook, the Department website, and other appropriate advertising venues. The Department is also encouraged to develop/maintain a predictable schedule of core-elective courses.

RECOMMENDATION SEVEN:

In light of the plans for a new Medical School at TMU, the PRT recommends that the Department explore potential synergies between its programs and the MD programs. For example, the Medical Physicists may be able to provide research opportunities for medical students. In the longer term, there may be an opportunity to create a Medical Physics residency at the medical school to provide opportunities for the graduates of the Medical Physics Masters/PhD program.

PROGRAM RESPONSE:

The program would like to thank the PRT for this insightful recommendation. The Department, in principle, agrees with it, though it considers that it is more relevant and applicable to our graduate-level programs (MSc/PhD) in Biomedical Physics. As such, we have already started exploring potential synergies between our graduate programs and the new TMU MD program. To this end, one of our faculty members has joined the TMU Medical School Development Committee, to represent our Department and to explore the feasibility of initiating a joint MD/PhD program along with potential collaborative research opportunities. Having said this, to give a full consideration to address this recommendation, the Department of Physics will initiate consultations with all major stakeholders including, among others, offices of the Dean, Faculty of Science, the Dean, Faculty of Medicine, and the Provost & Vice-President, Academic, and will conduct a comprehensive SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis toward preparing an implementation plan proposal.

DEAN'S RESPONSE:

The Associate Deans from the Medical School have been engaged in discussion of how the FOS students from the Toronto campus would be able to access research opportunities at the Medical School in Brampton, and vice versa. Impacts to the Graduate Program, including any potential for joint MD/PhD programs, are beyond the scope of the review of the undergraduate program.

IMPLEMENTATION PLAN: SCHOOL OF MEDICAL PHYSICS

Priority Recommendation #1: Enhance learning support and background preparation for students, especially on fundamental topics in Physics and Mathematics.

Rationale:

- An increasing number of students entering the Program do not possess the required background knowledge in Physics and Mathematics (TMU UPO data, 2015-2022, PPR Self-Study Report).
- Extensive discussion among the Program's faculty members during several faculty meetings in the 2023-24 academic year dedicated to the PPR recommendations (SWOT/SOAR analysis).
- Feedback from the Program's students at different stages of study in the Program, especially the upper years (3rd and 4th years) in which they identified the need for enhancing learning support and background preparation in Physics and Mathematics in the curriculum.
- As section 8.2. of the Self-Study outlines, the Program will review the contents of the courses delivered by the Department on a continuing basis to ensure that each course meets the overall program's objectives. Student success in each course relies on the background knowledge attained in the prerequisite courses.
- Recommendation made in the PRT report (#5): the PRT recommends that the program examine patterns of enrollment to determine why graduation times seem to extend beyond 4 years for many students. This would be particularly important for the recruitment of international students into the program.

Implementation Actions:

- Background material review (1 to 3 hours) will be integrated in lectures and/or tutorial session(s) in all Program courses starting from year one. The background review session(s) will cover fundamental topics in Physics and/or Mathematics that a student needs to learn (or be reminded of) in order to succeed in the course.
- At the discretion of the course instructor, the background review sessions could be delivered during the course lecture and/or the tutorial sessions (if there is a tutorial component for the course).
- Tutorial TAs need to be trained and provided with the required lecture materials by the instructor, in case of delivery during a tutorial session.
- Instructors will report to the Program on this activity in the syllabus included in the course outline.

Priority/Timeline:

High / Within 1-2 years

Year 1: Implementation in all lower-year (1st and 2nd years) program courses.

Year 2: Implementation in all program courses.

Responsibility for:

a) leading initiative: Dept. Chair and UPD; All program instructors and faculty members.

b) approving recommendation, providing resources, and overall monitoring:

- Implementation: Dept. Chair, Undergraduate Program Director (UPD), all program instructors and faculty members.
- Resources: TMU UPO data

Approvals: Undergraduate curriculum committee, UPD, Dept. Chair

Priority Recommendation #2: Implementation of strategic curriculum changes for a more uniform course workload in the second and third years of the Program.

Rationale:

- These curriculum adjustments will make the students' course load more uniform in the second and third years of the Program, as well as providing a better sequence in the delivery of knowledge and of required background, particularly for upper-level courses.
- Extensive discussion among the Program's faculty members during several faculty meetings in the 2023-24 academic year dedicated to the PPR recommendations (SWOT/SOAR analysis).
- Feedback from students enrolled in different years of study in the Program.
- Recommendation made by the PRT in their report (#5). The PRT recommends that the program examine patterns of enrollment to determine why graduation times seem to extend beyond 4 years for many students.
- Recommendation made by the PRT in the "Additional Notes Extracted from the PRT Report". Specifically, the comment on the Self-Study Section 2.4 (Teaching and Assessment) points out that a review of the sequencing of content knowledge (not just skill learning outcomes) may help to streamline course contents and address some of the student concerns.
- The Dean's comment encourages appropriate levels of rigor and subject mastery to be reflected in each year of the program's curriculum.
- **Recommendation #2 from PRT:** the program expand its core offerings in the third year to include courses in areas such as the 'physics of medical accelerators' and 'biomedical optics'.

Implementation Actions:

- Reposition PCS401 - Quantum Mechanics I, from Semester 4 (2nd year) to semester 5 (3rd year).
- Reposition PCS 230 – Photonics and Optical Devices from Semester 5 (3rd year) to semester 4 (2nd year).

Priority/Timeline: High / Within 1-2 years

Year 1: Prepare and submit calendar change forms.

Year2: Implement changes in the program's curriculum

Responsibility for:

a) leading initiative: Dept. Chair and UPD

b) approving recommendation, providing resources, and overall monitoring:

- Implementation: UPD and Program's admin. staff
- Resources: Program's office

Approvals: UPD, Dept. Chair, FOS UCC and FOS Council

Priority Recommendation #3: Avoid evaluation overload and emphasize fair design and assessment of evaluations.

Rationale:

- 2020 NSSE survey results.
- Feedback from students and alumni of the program (students/alumni surveys conducted as part of self study (sections 4 and 5 of the Self-Study Report)).
- Extensive discussions and consultations among the Program's faculty members took place during the 2023-24 academic year and in several faculty meetings dedicated to the PPR recommendations and the SWOT/SOAR analysis. The goal was to identify:
 - (1) Systemic obstacles preventing the students from progressing through the Program as scheduled, and
 - (2) Possible causes of students under-performing in a number of Program courses.

Recommendation #5 made by the PRT in their report.

Implementation Actions:

- Major in-class evaluations (midterm tests, quizzes, etc.), will take no more than 3 hours out of 36 hours of total one-term lecture time.
- The weight of the final examination will be kept below 50%, typically in the 30% to 50% range, to ensure that enough marking weight is allocated to all the term coursework evaluation components, including tests, labs, tutorials, projects, presentations, reports, case studies, etc.
- Consider including extra questions in the midterm and final exams and grade the exams based on a subset of these questions with the best grades (e.g. 8 or 9 best answers out of 10 questions).
- Adhere to the best practices of evaluations design and continuously monitor the reliability and validity of the summative evaluation questions. For example, consider reassessing the weight of questions that are flagged as unreliable as a result of a statistical analysis (for example, a question that receives an extremely low average for the whole class (e.g. below 30%), including a low outcome for good students.
- All Program courses provide a formula sheet for major evaluations (including the final exam and midterm test(s)). The formula sheets will be prepared either by the instructor (and offered with the Test/Exam booklet) or prepared and brought to the Test/Exam by the students under precisely defined guidelines.

Priority/Timeline: High / Within 1-2 years

Responsibility for:

a) leading initiative: Dept. Chair and UPD

b) approving recommendation, providing resources, and overall monitoring:

- Implementation: All program instructors and faculty members.
- Resources: Center for Excellence in Learning and Teaching (CELT)

Approvals: UPD, Dept. Chair

Priority Recommendation #4: Harmonize student workload in the undergraduate labs to enhance experimental skills and experiential learning.

Rationale:

- Extensive discussion among Program's faculty members in several faculty meetings dedicated to the PPR recommendations during the 2023-24 academic year (SWOT/SOAR analysis).
- Feedback from the Program's technical staff in charge of running the labs.
- Feedback from Program students enrolled in different years of study in the Program.

Implementation Actions:

- For all Program courses with lab components, emphasize on experimentation skills and experience, data collection/analysis and experiential learning during lab sessions while simplifying reporting requirements.
- For first-year Program courses, it is recommended to use short-format lab reports for all laboratory experiments.
- For second and upper-year courses, it is recommended to implement a combination of short and full lab reports (short reports for four labs and a full report for one lab). The topic chosen for the full report will be specified by the course instructor and can be rotated (within the course for the same year and/or from year to year).
- The course instructor will decide on the grade weight of the full lab report vs. the short lab reports.

Priority/Timeline: Moderate / Within 2-3 years.

Years 1-2: Implementation in all lower-year (1st and 2nd years) program course labs.

Year 3: Implementation in all program course labs.

Responsibility for:

a) leading initiative: Dept. Chair and UPD

b) approving recommendation, providing resources, and overall monitoring:

- Implementation: UPD, program technical staff, all program instructors and faculty members.
- Resources: Dept teaching lab resources.

Approvals: Dept. technical manager, UPD, Dept. Chair

Priority Recommendation #5: Enrich the Medical Physics curriculum courses and/or learning objectives by adding topics on AI and Deep Learning.

Rationale:

- Artificial Intelligence (AI) and Deep Learning have increasingly become integral components of current Medical Physics applications, for example, among others, Medical Imaging, and Image-Guided Radiotherapy.
- Feedback received from Program's students during several Town Houses and surveys.

- SWOT/SOAR analysis performed by the Program as part of the PPR self study report.
- The thrust of this initiative is to incorporate into our Medical Physics Program a higher level of computational expertise and of competency on the nature and applications of AI and Deep Learning as applied to Medical Physics. This will extend the students' range of options regarding job placement in the field after graduation, and better prepare them for research and/or for the job market, with a comprehensive skill set in these new important areas.

Implementation Actions:

- To include a stronger emphasis on computational abilities as well as AI and deep learning through:
 - (1) Inclusion of these topics in course contents of the Program's higher-year required courses, and
 - (2) Addition of courses from other Programs to the list of core electives (Table 2.2) to better cover these topics.
- Examples of potential upper-year required courses that would benefit from the addition of these topics in their curricula are: PCS405- Medical Imaging, PCS407- Radiation Therapy, PCS521- Mathematical Physics, PCS622- Mathematical Methods in Medical Physics, PCS350- Computational Methods in Medical Physics, and PCS40A/B- Medical Physics Thesis.
- Examples of potential courses from other programs to be included in the core elective list are: MTH640 - Complex Analysis, MTH712 - Partial Differential Equations, MTH655 - Financial Innovations, and CPS521- Introduction to Data Science.
- The choice of courses to be included/added to the curriculum, will be discussed by all faculty members and finalized by the Department Undergraduate Curriculum Committee before being brought for approval by the Departmental Council, the FOS UCC, and the FOS Council.
- Course calendar change forms will be prepared and submitted to the TMU calendar office by the Program.

Priority/Timeline: Moderate / Within 2-4 years

Year 1: Selection of topics and courses.

Years 2-4: Preparation and submission of required calendar change forms and addition of AI-related components to PCS courses.

Responsibility for:

a) leading initiative: Dept. Chair, UPD

b) approving recommendation, providing resources, and overall monitoring:

- Implementation: Program's faculty members, UPD and Program's admin. staff
- Resources: Program's office

Approvals: Department UCC, Department Council, FOS UCC and FOS Council

Priority Recommendation #6: Introduction of a new stream (career path) in Health Physics/Radiation Sciences in addition to the current streams in Medical Physics.

Rationale:

- There is presently a decline in the number of radiation science-related professionals in North America, in particular the number of health physicists, pointing to a looming shortage of workers in this important area (for example, medical isotope production, radiation biology and radiation protection officers) [*"Alarm sounded over declining US radiation professional workforce"*, Physics Today, Volume 76, Issue 10, October 2023].
- Health Physics/Radiation Protection is one of the few Medical Physics fields that often does not require an advanced degree and therefore is of particular interest to students graduating with a Bachelor of Science who do not wish to pursue graduate studies. Therefore, the Department sees an opportunity to fill in this gap by adding one more stream (career path) within its existing Medical Physics program.
- The stream that could be titled Health Physics / Radiation Sciences will provide the graduates with a new potential career path.
- The required level of competency can be achieved by a careful selection of Core Elective courses; undertaking relevant projects through two Directed Project courses (also included in the Core Electives table); and completing a fourth year Medical Physics Thesis course under the supervision of a faculty member with the appropriate research/professional expertise in Health Physics an/or Radiation Sciences.
- The PRT report recommends that the department proceed with its plan to create a new stream (career path) in Health Physics/ Radiation Sciences (Recommendation #4 in the PRT report).

Implementation Actions:

- In order to support this recommendation, the Dean has requested that a thorough needs-assessment be performed. The Department will as well need to assess whether Health Physics/Radiation Science is best included in their curriculum by the creation of a Concentration or an Optional Specialization in line with the Curriculum Structure described in Policy 2.
- To address the Dean's recommendation above, the department's Undergraduate Curriculum Committee will be tasked to assess the feasibility of creation of the new concentration/career path under Policy 2 and outline an implementation plan to bring to the Departmental Council for discussion and vote.

Priority/Timeline: Medium / Within 2-4 years

Responsibility for:

a) leading initiative: Dept. Chair, Dept. UPD, Dept. Undergraduate Curriculum Committee (UCC)

b) approving recommendation, providing resources, and overall monitoring:

- Implementation: Department UCC, Department Council
- Resources: Program's TFA

Approvals: FOS UCC, FOS Council, Senate ASC

Priority Recommendation #7: Expand the Program's outreach and recruitment activities.

Rationale:

- A set of vibrant outreach activities will result in a larger enrollment as well as an increase in the percentage of students entering the Program from Ontario High Schools with higher GPAs.
- Extensive discussion among program's faculty members in several faculty meetings dedicated to the PPR recommendations during the 2023-24 academic year (SWOT/SOAR analysis).
- An increasing number of students entering the program do not possess the required background knowledge (TMU UPO data, 2015-2022, PPR self study report).

Implementation Actions:

In coordination with TMU's outreach and admission offices, expand the initiatives regarding the following activities:

- Outreach activities organized by TMU (Open Houses, Toronto-wide outreach activities, etc.)
- Faculty of Science outreach activities (Science Rendezvous, Soapbox Science, etc.)
- Continued participation in the Ontario University Fair
- Targeted advertisement and outreach activities such as:
 - a. Active interaction with Ontario high-schools physics teachers and counselors (e.g. the department organized and hosted the 2024 Annual Conference of the Ontario Association of Physics Teachers held on May 2024 at TMU)
 - b. Presentations in Ontario high schools
 - c. High-school students tours/visits to our undergraduate labs
 - d. Workshops for high school teachers and counselors

Priority/Timeline: Moderate / Within 1-5 years

Responsibility for:

a) leading initiative: Dept. UPD, Dept. Chair

b) approving recommendation, providing resources, and overall monitoring:

Approvals: Dept. UPD, Dept. Chair

Priority Recommendation #8: Enhance the advising experience for students by streaming them into appropriate course selections.

Rationale:

- The multidisciplinary nature of the program demands that core electives be offered from a variety of disciplines. Students expressed the need for increased career counseling from

faculty and staff, along with greater support and opportunities from the University's Career & Co-op Centre (according to the students' survey/interviews, PPR self-study, p.32).

- This time-intensive activity may be delivered with the help of the administrative staff as "first-responders". This may address partly the question of course availability and graduation times (Priority Recommendation # 8).
- The availability of an administrative staff member as a first responder, will greatly help the Program to enhance its methods/strategies to advise students and improve students' success in the Program.
- The Department will develop curriculum maps showing the developed stream that can be shared in the student handbook, the Department website, and other appropriate advertising venues.

Implementation Actions:

- The designated staff, typically at a departmental administrative level, will be trained by the Program to this end, specifically by the Chair, the Undergraduate Program Director, and the Staff manager. Therefore, it is crucial for the Department of Physics to maintain its current level of administrative staff resources.
- Curriculum maps showing the available streams will be developed and shared with the students through the Student Handbook and/or the Departmental website.

Priority/Timeline: High, short-term 1-2 years

Responsibility for:

a) leading initiative: the Chair, the UPD, and the Staff manager

b) approving recommendation, providing resources, and overall monitoring:

provide additional training regarding student counselling about the program options to the staff members of the Department.

Approvals: Undergraduate curriculum committee, UPD, Dept. Chair

Priority Recommendation #9: Examine patterns of enrollment to determine why graduation times exceed 4 years for many students.

Rationale:

- The PRT recommends that the program examine patterns of enrollment to determine why graduation times extend beyond 4 years for a number of students (Recommendation #5 from the PRT report).
- This would be particularly important for the recruitment of international students into the program.
- This item has been flagged already in the PPR Self-Study document, in which a set of recommendations were proposed that focused directly on this issue (Recommendations 1 to 4 in the PPR self-study document).

Implementation Actions:

- The Program has already started work to address this issue. This is reflected in the submitted PPR self-study, where a set of recommendations were proposed focusing directly on this problem (Recommendations 1 to 4 in the PPR self-study document).
- Implementation of Recommendation #6 made by the PRT team will further address this issue.
- The Department will work with the Dean's office to assess whether the existing pre-requisite structure within the Physics Program contributes to unnecessary delays in program completion.
- A student and alumni survey will be conducted periodically in order to understand what non-academic factors, if any, contribute to not meeting the 4-year graduation timeline.

Priority/Timeline: High, short-term 1-2 years

Year 1: conducting student and alumni survey

Year 2: developing strategy to improve students' graduation time

Responsibility for:

a) leading initiative: Chair, UPD, staff

b) approving recommendation, providing resources, and overall monitoring:

Approvals: Chair, UPD, staff, Dean's Office

Priority Recommendation #10: Strengthening the Co-op Program

Rationale:

- Additional notes from the PRT (Section 2.3 - Curriculum) point out that the Co-op program is a valuable option being offered but the uptake seems to be low. Comments from the students indicate that students are restricted by the Co-op office in applying for jobs. Since the program is highly interdisciplinary, students should be able to apply for co-op opportunities in various sectors. A discussion with the co-op office might help to smooth out any issues.
- While not unique to the Program, it may be possible for students to have more opportunities for co-op placements with a stronger coordination with the TMU Co-op office.

Implementation Actions:

- The program will start a discussion with the Co-op office focusing on improving the availability of possible experiential learning opportunities for students in the Program.
- The Co-op office should continue to encourage students to consider placements that reflect the interdisciplinary nature of their training, as well as being encouraged to consider looking for positions outside of local offerings.

Priority/Timeline: High. Long-term, ongoing collaboration with the Co-op office is needed

Responsibility for:

a) leading initiative: Co-op Advisor, Chair, UPD, co-op office

b) approving recommendation, providing resources, and overall monitoring:

Approvals: Co-op Advisor, Chair, UPD, co-op office

Priority Recommendation #11: Faculty complement will remain at 18 full-time faculty members

Rationale:

The PRT recommends that the faculty complement remain at 18 full-time faculty members so that course delivery of core medical physics courses (such as radiation therapy or medical imaging) may be offered on a regular basis. They note that the vacancy created by the resignation of a faculty member is being filled by an ongoing search.

This is a valid and crucial recommendation in order to maintain the depth and breadth of the program and Departmental operation in all areas of teaching, SRC, and service, and be able to implement improvements outlined in the PPR self-study document and recommended by the PRT, such as the addition of a new career path in the program in Health Physics/Radiation Sciences, enhancing program's students success, and leveraging the potential synergies between the Department of Physics and the Medical Physics Program and the new MD program at TMU.

To this end, the Department has hired Dr. Edward Taylor an accredited clinical medical Physicist/ Researcher currently holding a senior clinical position in the radiation oncology department at Princess Margaret Hospital. Dr. Taylor will start his position as a faculty member in the Physics Department on July 1st, 2025.

Implementation Actions:

Hiring has been accomplished

Priority/Timeline:

Completed on July 1st, 2025

Responsibility for: Hiring committee, Dean, VP Faculty Affairs

a) leading initiative: Dept. Chair, DHC Chair

b) completed

PRT Recommendation # 3: Recommendation for the program to be provided with the support needed to replace teaching equipment reaching their end of life

Link to PPR Self Study – Recommendation # 3

Link to PRT Report – None

Dean Comments - *This recommendation represents a resource request that goes beyond the program review process. While the Dean's Office can work with the Department to identify possible initial funding sources for such infrastructure, ongoing costs for maintaining such teaching infrastructure should be incorporated into the Department's operating budget.*

Rationale:

As per the Dean's comment, this recommendation goes beyond the program review process and thus is not addressed in this document.