

# PHYSICS, M.SC.

Physics and Astronomy

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**Academic Staff:** Please refer to the Physics and Astronomy website (<https://sci.umanitoba.ca/physics-astronomy/people/>) for Faculty information.

## Physics and Astronomy Program Information

The department offers opportunities for graduate study in several experimental and theoretical fields of contemporary interest, leading to the Master of Science and Doctor of Philosophy degrees.

## Admission Information

### Admission to the Faculty of Graduate Studies

Application and Admission Procedures are found in the Academic Guide (<https://catalog.umanitoba.ca/graduate-studies/academic-guide/application-admission-registration-policies/>).

Admission requirements for Master's students are found in the Master's Degrees General Regulations ([https://catalog.umanitoba.ca/graduate-studies/academic-guide/masters-degrees-general-regulations/#Admission\\_FGSMasters](https://catalog.umanitoba.ca/graduate-studies/academic-guide/masters-degrees-general-regulations/#Admission_FGSMasters)) section of the Guide.

### Physics and Astronomy M.Sc. Admission Requirements

To enter the Master's program directly, a student must have an Honours B.Sc. degree in Physics and Astronomy, Mathematics and Physics, or Engineering Physics from the University of Manitoba or the equivalent. Students without the degree entrance requirements will have their undergraduate program evaluated and may be required to complete a pre-Master's program of selected University of Manitoba undergraduate courses.

## Application Information

Students should complete and submit their online application with supporting documentation by the date indicated on the Physics M.Sc. program of study ([https://umanitoba.ca/faculties/graduate\\_studies/admissions/programs/physics.html](https://umanitoba.ca/faculties/graduate_studies/admissions/programs/physics.html)) page.

## Degree Requirements

A Master's degree in physics normally consists of both coursework and a thesis. For students in the Comprehensive Medical Physics M.Sc. program, the course load is increased and the thesis requirement is replaced by research project.

The Master's program with thesis consists of two or three courses from the 7000 series offered by the department or from another department offering courses suitable for the candidate's program. In special cases, courses may be drawn from the 4000 series as listed. The program of study extends through a minimum period of twelve months. Frequently two summers of research work plus one winter of research

and coursework are required to complete the program. In addition to coursework, these students must submit a thesis and defend it orally.

The Comprehensive M.Sc. program in medical physics is a two-year (18-month, course work, 6-month research project) program which requires 36 credits. A clinical research project in an approved laboratory and the submission of a research report is also required. On completion of the coursework and research project, the student will be required to pass a comprehensive oral examination.

**Expected Time to Graduate:** 2 years

## Progression Charts

### Thesis Program

Course	Title	Hours
<b>Year 1</b>		
GRAD 7300	Research Integrity Tutorial	0
GRAD 7500	Academic Integrity Tutorial	0
Courses at the 7000 level		6
Courses at the 3000 level or above <sup>1</sup>		6
<b>Hours</b>		<b>12</b>
<b>Year 2</b>		
GRAD 7000	Master's Thesis	0
<b>Hours</b>		<b>0</b>
<b>Total Hours</b>		<b>12</b>

<sup>1</sup> All undergraduate courses chosen from outside the department must be relevant to the thesis work.

### Comprehensive Program in Medical Physics

Course	Title	Hours
<b>Year 1</b>		
GRAD 7300	Research Integrity Tutorial	0
<b>Hours</b>		<b>0</b>
<b>Term 1</b>		
PHYS 7390	Radiation Protection	3
PHYS 7360	Medical Radiation Physics	3
GRAD 7500	Academic Integrity Tutorial	0
<b>Hours</b>		<b>6</b>
<b>Term 2</b>		
PHYS 7370	Radiation Therapy Physics	3
PHYS 7470	Methods in Medical and Health Physics 2 - (Radiotherapy and Radiation Biology) <sup>1</sup>	3
BME 7012	Foundation of Physiology <sup>2</sup>	
ANAT 7014	Functional Human Anatomy <sup>2</sup>	
<b>Hours</b>		<b>6</b>
<b>Years 1-2</b>		
Select up to 12 credit hours of additional elective courses <sup>3</sup>		6
<b>Hours</b>		<b>6</b>
<b>Year 2</b>		
<b>Term 1</b>		
PHYS 7380	Radiation Biology	3
PHYS 7400	Linear Systems for Imaging	3
PHYS 7422	Physics of X-ray Imaging	3
<b>Hours</b>		<b>9</b>

**Term 2**

PHYS 7410	Diagnostic Methods	3
PHYS 7430	Physics of Nuclear Medicine	3
PHYS 7460	Methods in Medical and Health Physics 1 - (Medical Imaging and Radiation Protection) <sup>1</sup>	3
PHYS 7700	Research Project in Medical Health Physics	0
GRAD 7010	Comprehensive Examination	0
GRAD 7000	Master's Thesis	0
<b>Hours</b>		<b>9</b>
<b>Total Hours</b>		<b>36</b>

- <sup>1</sup> Research-based M.Sc. or Ph.D. Students should NOT take PHYS 7460 and PHYS 7470.
- <sup>2</sup> Students who have not taken Anatomy or Physiology at an undergraduate level (BIOL 1410, BIOL 1012 or BIOL 2410 or equivalent) are required to take ANAT 7014 Functional Human Anatomy (2) and/or BME 7012 Foundation of Physiology (2) in addition to the courses listed above.
- <sup>3</sup> Up to 12 credit hours of additional electives may be taken to achieve a minimum of 36 credit hours of coursework and to meet program needs. At least 6 credit hours must be courses at the 7000 level, while 6 credit hours may be 4000 or higher level courses. Approved 4000 level courses include PHYS 4386, PHYS 4250, PHYS 4516, PHYS 4646.

## Registration Information

Students should familiarize themselves with the Faculty of Graduate Studies 'GRAD' courses applicable to their program (<https://catalog.umanitoba.ca/graduate-studies/registration-information/>). If you have questions about which GRAD course(s) to register in, please consult your home department/unit.

All students must consult with their advisor prior to registration.

## Regulations

Students must meet the requirements as outlined in both Supplementary Regulation and BFAR documents as approved by Senate.

### Supplementary Regulations

Individual units may require specific requirements above and beyond those of the Faculty of Graduate Studies, and students should consult unit supplementary regulations (<https://umanitoba.ca/graduate-studies/supplementary-regulations/>) for these specific regulations.

### Bona Fide Academic Requirements (BFAR)

Bona Fide Academic Requirements (BFAR) (<https://catalog.umanitoba.ca/graduate-studies/academic-guide/academic-performance-general/#BFAR>) represent the core academic requirements a graduate student must acquire in order to gain, and demonstrate acquisition of, essential knowledge and skills.

All students must successfully complete:

- GRAD 7300 prior to applying to any ethics boards which are appropriate to the student's research or within the student's first year, whichever comes first; and
- GRAD 7500 within the first term of registration;

unless these courses have been completed previously, as per Mandatory Academic Integrity Course (<https://catalog.umanitoba.ca/graduate-studies/academic-guide/academic-performance-general/#GRAD7500>) and Mandatory Research Integrity Online Course (<https://catalog.umanitoba.ca/graduate-studies/academic-guide/academic-performance-general/#GRAD7300>).

Students must also meet additional BFAR that may be specified for their program.

### General Regulations

All students must:

- maintain a minimum degree grade point average of 3.0 with no grade below C+;
- meet the minimum and not exceed the maximum course requirements, and
- meet the minimum and not exceed the maximum time requirements (in terms of time in program and lapse or expiration of credit of courses).