



THE UNIVERSITY OF WINNIPEG

For more information visit www.uwinnipeg.ca or contact a student recruitment officer at welcome@uwinnipeg.ca or 204.786.9844. In any case where The University of Winnipeg Course Calendar and this fact sheet differ, the current Calendar takes precedence.

Physics

Physics is the quest to understand all natural phenomena using scientific methods.

The goal of physics is to formulate theories, or “laws,” which summarize our knowledge of the natural world. We don’t yet know all the basic laws of nature, or how many laws there are.

The famous physicist Richard Feynman said the first principle of science is that the test of all knowledge is experiment and experiment is the sole judge of scientific “truth.” But what is the source of knowledge? Where do the laws that are to be tested come from? Experiment itself helps to produce these laws in the sense that it gives us hints. We also need imagination to create from these hints the great generalizations. We have to guess at the wonderful, simple, but very strange patterns beneath natural phenomena, and then to experiment to check again whether we have made the right guess. Physics needs people with imagination and a thirst to understand the inner workings of nature.

Research in physics has led to revolutionary discoveries like lasers, magnetic resonance imaging, fibre optic communications, and transistors. These developments and there is following from fundamental physics research have had and will have great importance upon human society in the twenty-first century.

The University of Winnipeg has a nationally recognized Physics Department, which offers an excellent learning atmosphere, fostered by small class sizes and individual attention from professors. Our professors’ research spans a broad range of topics in both theoretical and experimental physics, and each professor is at the top of the field in his or her research area. The experimentalists study subatomic physics (especially neutron and neutrino particles), the inner workings of the nucleus, and the use of magnetic resonance imaging (MRI) in diagnosing disease, while the theorists imagine, deduce, and investigate the inner workings of black holes, higher-dimensional cosmology superstrings and quantum gravity. Students are encouraged to participate in these research activities and often find summer employment with the various research groups. Students can study for their **Bachelor of Science degree (3-year, 4-year, or Honours)**. The 4-year and Honours programs have the specialized options of Chemical Physics and Mathematical Physics streams.

SAMPLE CAREERS

Our program emphasizes critical thinking, decision making, and creative problem solving skills. These qualities have helped our graduates to secure employment in many areas, including computers, engineering, finance, geophysics, lasers and optics, medical physics, military applications, space science, teaching, and high-tech, academic, and corporate research.

A UNIQUE OPPORTUNITY: DUAL DEGREE IN PHYSICS AND ENGINEERING

The University of Winnipeg and the College of Science and Engineering have teamed up to offer an exciting dual degree program in engineering for students who want to attend one of the top engineering schools in North America.

Students begin the dual degree at The University of Winnipeg by studying Mathematics, Biology, Chemistry, Geography, or **Physics**. Those students who complete a 3-year Bachelor of Science degree in any of these majors, and who have a minimum GPA of 2.5 – 2.8 (depending on the program), are **guaranteed a place in IT’s Engineering program**. Students complete the dual degree with a final two years of study, in Minneapolis at IT, where they will earn an engineering degree. Upon graduation from the dual degree program, you can make

application to practice engineering in the Canadian province or other jurisdiction in which you wish to practice. For more information about Engineering, contact the Physics Department at The University of Winnipeg, or contact Ben Sharpe at the University of Minnesota by calling **612.624.8504** or emailing sharp003@umn.edu

FIRST-YEAR COURSES

Foundations of Physics I is a calculus-based first-year course which provides students with a working knowledge of basic concepts underlying modern physics. It is primarily for Physics majors, but it is also useful for students interested in science.

Introduction to Physics is a non-calculus first-year course intended for pre-medical, pre-dental and other students who require a broader introduction to physics.

Astronomy is a non-mathematical course that gives students a general introduction to the ideas and processes of science as well as the formation and evolution of the universe.

MORE SAMPLE COURSES

Cosmology: Science Fact to Science Fiction
Foundations of Physics II
General Relativity
Mathematical Physics I & II
Quantum Mechanics I & II

Scientific Computing & Computational Physics
Condensed Matter Physics
Subatomic Physics
Thermal Physics I & II
Medical Imaging

WHAT OUR STUDENTS SAY...

"Because of their depth of knowledge and their willingness to help students learn, I was continually impressed by my professors in the Department of Physics. At other universities, classes such as first-year Physics seem to be looked upon with disdain as a chore, but at The University of Winnipeg, the professors give the impression that they truly enjoy those classes, and the ability it gives them to get others interested in their field." - *Vladimir Gidzak (BSc '02 Physics) who completed a bachelor's degree in Aerospace Engineering at the University of Minnesota through the dual degree program in engineering, and is then completed a PhD degree in aerospace engineering (2010) at the University of Minnesota.*

DID YOU KNOW?

- It was a physicist who started the Internet as a way to share information.
- Einstein said, "Imagination is more important than knowledge."
- Terms like *black hole*, *quasar*, *quark*, *microwave*, *infrared*, *ultraviolet*, *x-ray*, *quantum*, and *relativity* all have their roots in physics.
- If you're interested in becoming a teacher, Physics can be used as a teachable major in our Education program.

PHYSICS STUDENTS' ASSOCIATION

The Physics Students' Association is an active student group, offering social events, interaction, and academic support. The Association is open to all Physics students, as well as faculty and staff.

SAMPLE FIRST YEAR

NOTE: *This sample first year is only representative of the courses you may take. For many of our programs, you may choose another set of courses and still be well on your way to a degree. Also, for most programs you do not have to take 30 credit hours (five full courses) in your first year.*

PHYS-1101(6) Foundations of Physics I

PHYS-2103(3) Computational Physics

MATH-1103 (3) Introduction to Calculus I AND MATH-1104 (3) Introduction to Calculus II

OR the equivalent MATH-1101(6) Introduction to Calculus

RHET-1103(3) Academic Writing: Science or any other section of Academic Writing (if required)

6 credit hours Humanities

CHEM-1111(3) Introduction to the Chemical Properties of Matter (optional)

CHEM-1112(3) Basic Principles of Chemical Reactivity (optional)

3 credit hours Elective, depending on interest. For example: GEOG-1201(3) Introductory Atmospheric Science, GEOG-1202(3) Introductory Earth Science, ENGL-1000(3) English 1A.

REQUIRED HIGH SCHOOL COURSES

In addition to meeting The University of Winnipeg's general admission requirements, you must have **Physics 40S** and **Pre-Calculus Mathematics 40S**. However, interested and motivated students without these prerequisites are also encouraged to contact the department. Introductory Physics (course number 38.1301) requires only **Pre-Calculus Mathematics 40S** or **Applied Mathematics 40S**. Courses in Astronomy, Modern Technology, Cosmology, and Scientific Computing do not require the above prerequisites.

HOW TO APPLY – Domestic Student

Apply online at uwinnipeg.ca or pick up an Application for Admission from your high school counsellor's office or the Admissions Office at The University of Winnipeg. To meet Scholarship deadline submit your application and \$80 application fee by **March 1st**.

HOW TO APPLY – International Student

Apply online at uwinnipeg.ca/index/intl-apply and submit all official documents by mail. To meet Scholarship deadline submit application, fee, and documents by **March 1st**. International application fee is \$100, which includes a one-time courier fee.

CONTACT US

The Physics Department

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<http://physics.uwinnipeg.ca>



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