Department of Engineering Physics
Faculty of Engineering
http://engphys.mcmaster.ca/

Opportunities for High School Students in Engineering Physics at McMaster University

What is Engineering Physics?

Engineering Physics is the investigation and application of fundamental principles of physics to create the next generation of technology. We are pushing the forefront of modern physics to better the world through technological advancement. We are solving the grand challenges of the future such as energy supply, human health, digital information and communications technology, and renewable energy.

The Department of Engineering Physics in the Faculty of Engineering at McMaster University includes opportunities in **Electricity and Magnetism**, **Light and Geometrical Optics**, **Energy and Society**, **Quantum Mechanics**, **Biotechnology**, and more.

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LEAP

The **Learning Enrichment Advancement Program (LEAP)** at McMaster offers 2-week summer programs in Engineering Physics. Students will conduct hands-on labs in **Photonics**, **Nanotechnology**, **Nuclear Energy**, and **Biomedical Engineering**. http://leap.mcmaster.ca/

Specialist High Skills Major (SHSM)

The SHSM is a specialized High School program that allows grade 11 and 12 students to focus their learning on a specific economic sector while meeting the requirements to graduate from secondary school. Engineering Physics at McMaster offers opportunities in the following SHSM fields: (1) **Energy**, (2) **Information and Communications Technology**, and (3) **Manufacturing**. Contact the department for more information: macdonne@mcmaster.ca

Co-op

The Department of Engineering Physics offers a High School Co-op program. The Co-op program allows students to conduct research with world-class faculty and facilities, and experience the university research and learning environment while earning High School credits.

The student application should include a cover letter (explaining why the applicant wants to do a co-op in Engineering Physics), a resume and academic transcript (credit counseling summary). The applicant should show proficiency in Math and Science, with an overall average of at least 88%. The department will review the application and schedule an interview if the student meets our academic requirements.

During the interview, we will determine the applicant's interests, and make a suitable match with one of our faculty professors. Contact the department for more information: macdonne@mcmaster.ca

Ambassadors

Our undergraduate student Ambassadors represent our department and are knowledgeable about our undergraduate programs, the happenings within the department, and help give prospective students a personal and informative connection with The Department of Engineering Physics and the McMaster community at large. They act as ambassadors for current and prospective students' questions and concerns, and serve as representatives at all relevant departmental, faculty, and university-wide events. If you have a question about the program, you can Ask an Ambassador.

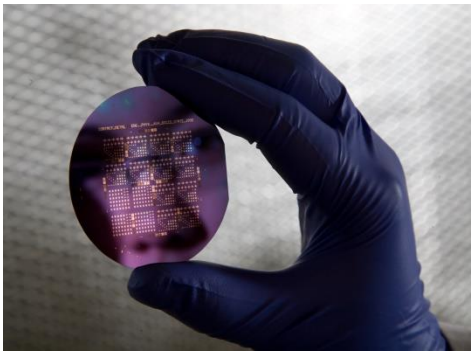
Student For a Day

Do you want to know what separates McMaster's Engineering Physics program from the rest? Come join us for a personalized experience. What do you want to know about our program? What day and time works best for you? Who do you want to meet? What would you like to see? This is an opportunity for you to become better acquainted with your future. After submitting Your Request, we'll match you up with an Ambassador who will be your Student For A Day guide. Your Ambassador will create an itinerary for your visit to Engineering Physics that encompasses the feedback you have provided to us. This program is open to Grade 11 and 12 High School students.

More on Engineering Physics

The Department of Engineering Physics specializes in **Nanotechnology Engineering**, **Energy Systems Engineering**, **Photonics Engineering**, and **Biomedical Engineering**.

Nanotechnology Engineering



Devices that are constructed on the nanometer or micrometer scale are the technological backbone of modern society. Since the invention of the transistor in 1947 and the introduction of the integrated circuit in the early 1960's, device components have continuously decreased in size and cost at an exponential rate, while increasing in speed and capabilities. The invention of fibre optic communications, essential for the internet, also relied on the development of optoelectronics, which is the study and application of electronic devices that generate, detect and control light.

More recently, the fabrication techniques developed for the integrated circuit industry have also been extended to micro-electro-mechanical systems (MEMS) which create tiny moving mechanical parts such as beams, gears, diaphragms, and springs that are used in inkjet-printers, accelerometers, inertial sensors, micro-mirrors, optical scanners, fluid pumps, and sensors.

In Engineering Physics, you will experience the world of Nanotechnology Engineering by exploring our cleanroom and seeing how nano-devices are made.

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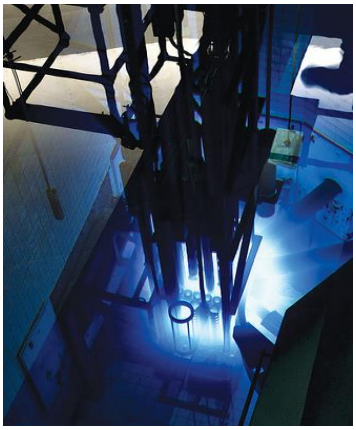
Energy Systems Engineering

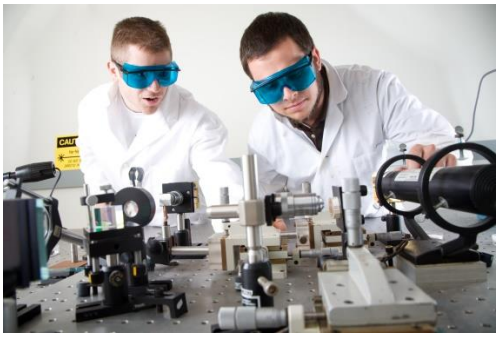


The Sun and stars are powered by nuclear fusion where heavier elements are combined to form lighter ones, releasing energy in the process. On Earth, this process is replicated in controlled nuclear reactors, where the nuclear energy released is converted to electricity for human use. In nuclear engineering, we apply scientific principles, engineering design and analysis, and computer modeling and simulation for the peaceful use of nuclear energy. Engineering Physics at McMaster University boasts a nuclear engineering program with a long and proud tradition. Situated on campus is the university's very own nuclear research reactor, providing many exciting and unique opportunities in the areas of reactor physics, nuclear safety analysis, and advanced nuclear materials.

We also conduct extensive research in photovoltaic devices (solar electricity) which convert sunlight directly into electricity. We are exploring alternative methods of producing high efficiency and low cost solar electricity using nanotechnology and micro-systems engineering.

In Engineering Physics, you will experience Energy Systems Engineering by exploring McMaster's nuclear reactor and the world of solar technology through hands-on projects.

Photonics Engineering



Photonics is the branch of science and engineering that deals with the generation, detection and application of light to provide useful applications for society. Photons are the quantum mechanical unit of light. Photons play a central role in many technologies. In the past two decades, photonics engineering experienced explosive growth in fibre optic communications, where light is used to transfer information over great distances. This formed the basis of the internet. The application of light also extends to many other industries such as medicine, displays, and sensors.

Engineering Physics encompasses a wide spectrum of projects involving light sources, lasers and light emitting diodes, photodetectors, sensors, photovoltaics, and optical displays.

In Engineering Physics, you will explore the world of Photonics Engineering by building your very own optical telecommunications system.

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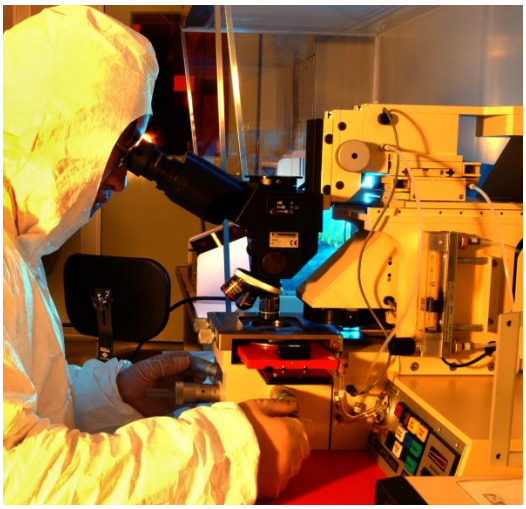
Biomedical Engineering



The Department of Engineering Physics specializes in biophotonics and biosensors. Biophotonics is a fast emerging field in which light is used for applications in medicine, biomedical engineering, life sciences, agriculture, and environmental science. The term biophotonics refers to a combination of biology and photonics, which is the science and technology of the generation, manipulation, and detection of photons, which are the quantum mechanical units of light. Biophotonics is being used for the study of biological molecules, cells and tissues for disease detection, diagnosis, and treatment. Light is a non-destructive probe of biological tissue, making it very useful for disease detection and diagnosis.

Engineering Physics is also involved in the development and application of micro- and nano-sensors for the detection of DNA, proteins, viruses, and other biological materials.

In Engineering Physics, you will explore Biomedical Engineering through hands-on biosensor and biophotonics projects.