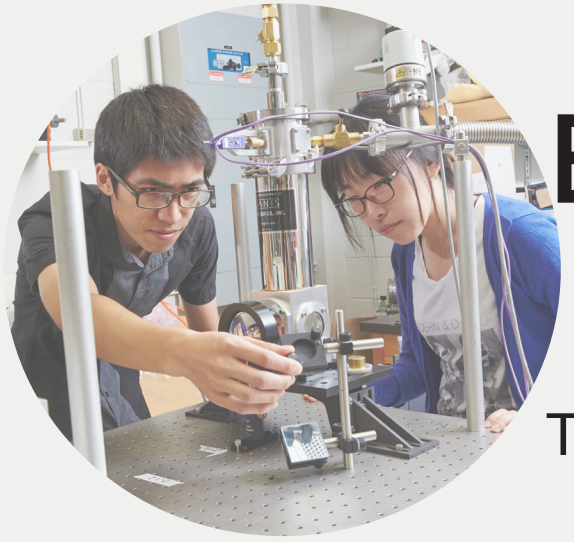
ENG PHYS

High School Viewbook

McMaster University

ENGINEERING

Engineering Physics



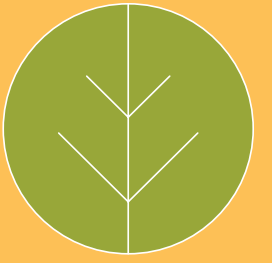
ENGINEERING PHYSICS STUDENTS

Turning discoveries into reality

Engineering Physics is an interdisciplinary field of study that involves the **application of fundamental physics** to create new solutions to challenging problems and **advance future technologies.**

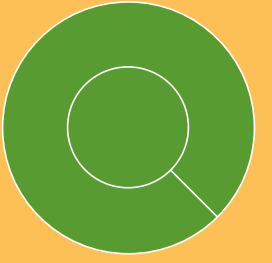
Our faculty and students are pushing the forefront of modern physics to better the world through **technological advancement.** We are developing today's and tomorrow's **advanced technologies** in fields as diverse as **Nano- and Micro- Devices Engineering, Nuclear Engineering, Photonics Engineering, Biomedical Engineering, and Smart Systems.**

digital

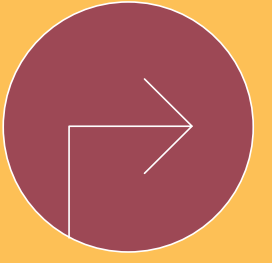


environment

health



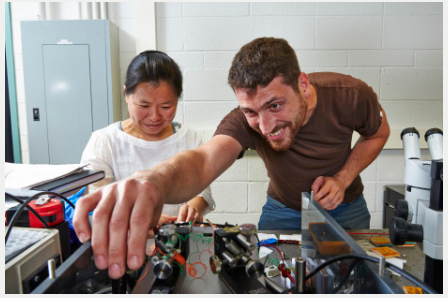
discovery



leadership

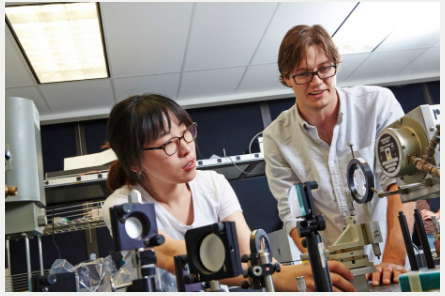
energy

Students may choose from a wide range of cutting-edge specialties including...



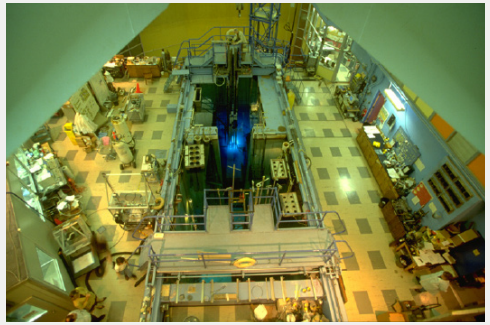
Nano- and Micro-Devices Engineering

Develop revolutionary nanotechnologies for information, communication, and sensing applications that enable tomorrow's technology



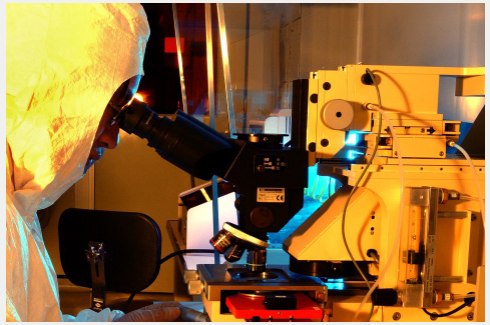
Photonics Engineering

Engineer the quantum particle of light for communications and manufacturing



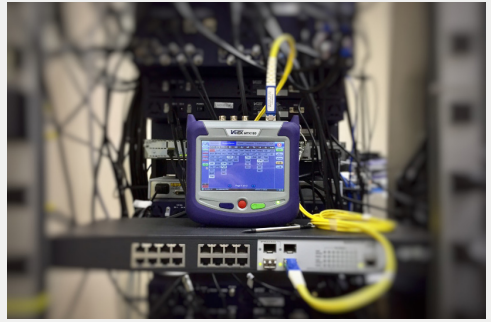
Nuclear Engineering

Innovate energy technologies for today and tomorrow to support a carbon-free future and a healthier world



Biomedical Engineering

Engineer biomedical sensors and systems to improve human health and well-being



Smart Systems Engineering

Smart systems that integrate various sensors and actuators to analyze and control a process

Interdisciplinary Engineering

Engineer novel solutions by applying concepts from mechanical, chemical, materials, electrical and other disciplines

Opportunities in Engineering Physics for High School Students

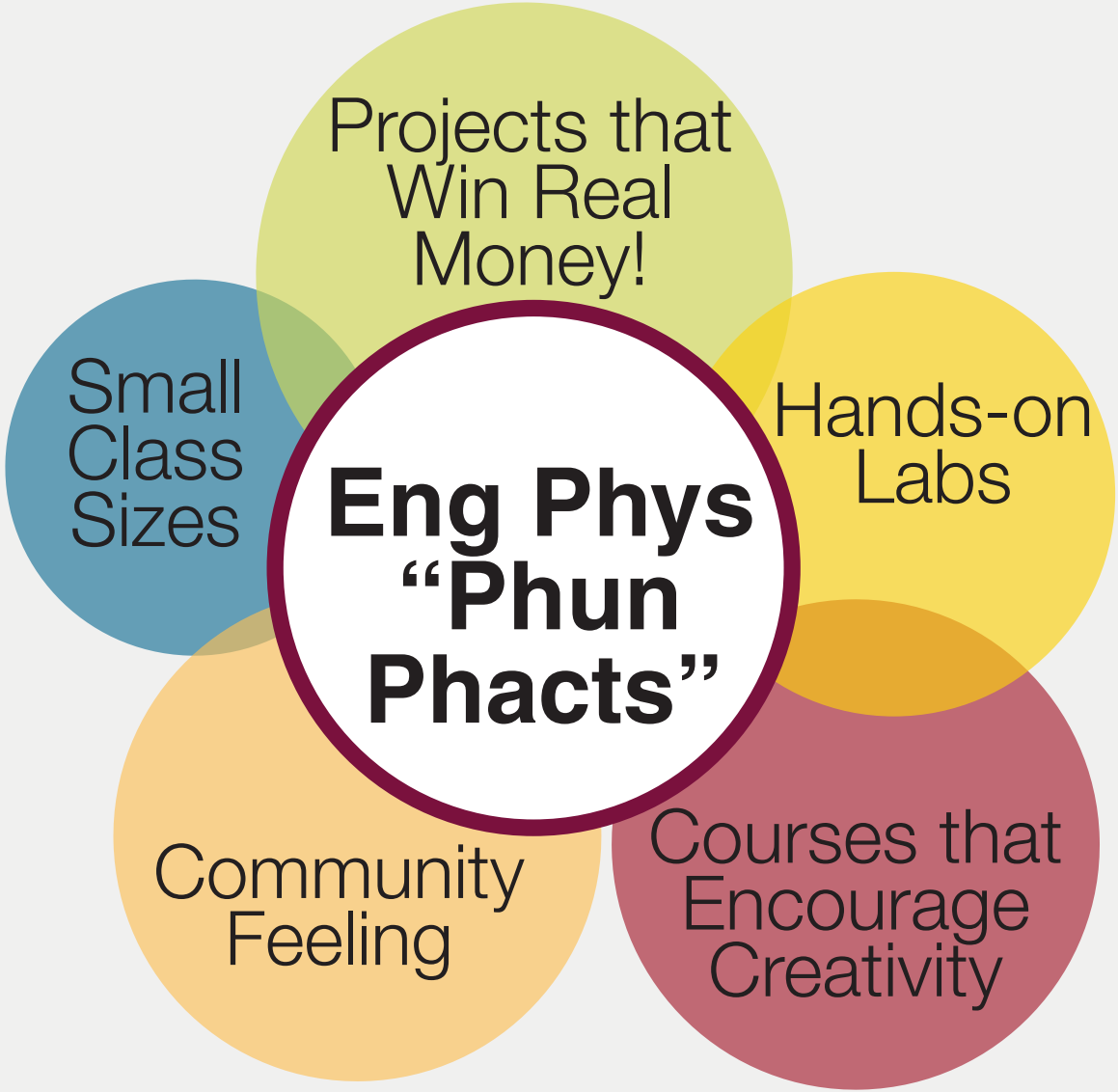
SHSM

Specialist
High
Skills
Major

TOURS

Biomedical
Nuclear Reactor
Nanotechnology
Solar Energy
Capstone Projects

Contact engphys@mcmaster.ca for more information about these high school programs and opportunities



CO-OP IN ENGINEERING PHYSICS

THE DEPARTMENT OF ENGINEERING PHYSICS IS PLEASED TO OFFER 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 co-op 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.

Questions or applications can be sent to:

engphys@mcmaster.ca

Be an Eng Phys Student for a Day

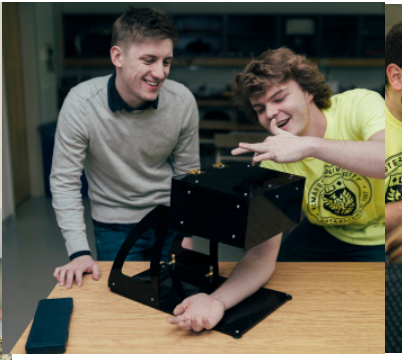
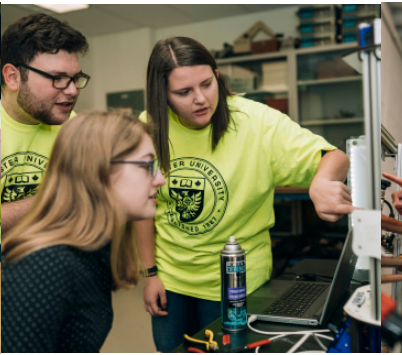
Experience a day-in-the-life of a McMaster Engineering Physics student!

Do you want to know what separates McMaster's Engineering Physics program from the rest? Come join us for a personalized experience.

After submitting your request, we will match you with an Engineering Physics Ambassador who will be your dedicated 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 students!

To register for Student For A Day, please visit our website:
http://bit.ly/McMasterEngPhys-StudentForADay




Did you know? Students will learn the tools to make integrated circuits and communication systems.

What is nanotechnology?

Devices that are constructed on the nanometre scale.

What role does nanotechnology play in the real world?

These devices are the technological backbone of the modern age of computers and high-tech communications.

A combination of the theory and application of modern physics.

Students will gain an understanding of device science and engineering through a series of hands-on device fabrication courses.

What can I learn?

Nanotech

Careers

- **Applications engineer**
- **Research scientist**
- **Semiconductor process engineer**
- **Product development engineer**

Nanotech-specific curriculum

1. Fundamentals of physical optics
2. Semiconductor device design
3. Microsystem device technologies
4. Applied physics laboratory

Core curriculum

1. Electricity and magnetism, thermodynamics
2. Engineering and classical mechanics
3. Quantum mechanics and its applications
4. Electronic devices and circuit design
5. Computer modeling and signal processing
6. Mathematics and mathematical physics
7. Engineering design projects

Did you know? Students will design and fabricate a solar cell, which are the building blocks of solar panels.

What is photonics engineering?

Photonics involves the generation, control, and detection of light to provide useful applications for society.

What role does photonics play in the real world?

The application of light extends to industries including medicine, biophotonics, sensors, displays, nanotechnology, manufacturing, and traditional optical engineering.

A combination of the theory and application of modern physics.

Courses that explore the science behind the application of light and considers this from a theoretical and an applied industrial perspective.

What can I learn?

Photonics

Careers

- **Entertainment industry**
- **Electronics/consumer goods**
- **Military, defense, aviation**
- **Medicine and biomedical applications**
- **Instrumentation and process control**

Photonics-specific curriculum

1. Fundamentals of physical optics
2. Applications of photonics
3. Lasers and electro-optics
4. Optical instrumentation
5. Optical communication systems
6. Solar energy

Core curriculum

1. Electricity and magnetism, thermodynamics
2. Engineering and classical mechanics
3. Quantum mechanics and its applications
4. Electronic devices and circuit design
5. Computer modeling and signal processing
6. Mathematics and mathematical physics
7. Engineering design projects

Did you know? Students will do experiments in McMaster's Nuclear Reactor.

What is nuclear engineering?

The application of scientific principles, engineering design and analysis, computer modeling and simulation, and government regulation for the peaceful use of nuclear energy.

What role does nuclear engineering play in the real world?

The design of alternative energy sources; nuclear reactor physics, safety, and operation; the design of next generation nuclear reactors; the investigation of industrial and medical uses of nuclear materials.

A combination of the theory and application of modern physics.

Courses cover a broad range of skills, which are transferable among all energy sectors. Principles of alternative energy sources such as photovoltaics, fuel cells, and wind power are explored in-depth.

What can I learn?

Nuclear

Nuclear safety and policy
Nuclear power plant design
Electrical power generation
Private industry
Consulting firms
Research institutions

Careers

Energy-specific curriculum

1. Principles of nuclear engineering
2. Introduction to energy systems
3. Industrial monitoring and detection
4. Nuclear reactor analysis

Core curriculum

1. Electricity and magnetism, thermodynamics
2. Engineering and classical mechanics
3. Quantum mechanics and its applications
4. Electronic devices and circuit design
5. Computer modeling and signal processing
6. Mathematics and mathematical physics
7. Engineering design projects

Did you know? Students will design and fabricate biosensors using state-of-the-art facilities.

What is biomedical engineering?

The study of biological molecules, cells and tissues for disease detection, diagnosis, and treatment.

What role does biomedical engineering play in the real world?

The development of biophotonics and biosensors in Engineering Physics is used for applications in medicine, life sciences, agriculture, and environmental science to improve human health.

A combination of the theory and application of modern physics.

Courses cover the development and application of biophotonics and micro- and nano-sensors for the detection of DNA, proteins, viruses and other biological materials.

What can I learn?

Biomedical

Careers

- **Medical physicist**
- **Cancer care researcher**
- **Medical doctor**
- **Medical technologist**

Biomedical-specific curriculum

1. Introduction to biophotonics
2. Biosensor fabrication
3. Semiconductor device manufacturing
4. Optical instrumentation
5. Fundamentals of physical optics

Core curriculum

1. Electricity and magnetism, thermodynamics
2. Engineering and classical mechanics
3. Quantum mechanics and its applications
4. Electronic devices and circuit design
5. Computer modeling and signal processing
6. Mathematics and mathematical physics
7. Engineering design projects

Did you know? Students will design and implement smart systems using optics, electronics and mechanics.

What is smart systems engineering?

A system that takes measurements, makes a decision and implements changes to a system based on advanced sensor information, actuators, feedback and other control mechanisms.

What role does smart systems engineering play in the real world?

Smart systems are used, for example, in advanced manufacturing automation, biosensors for monitoring and correcting human health, search and surveillance applications, and much more.

A combination of the theory and application of modern physics.

Courses cover optics, mechanics, and electronics associated with smart systems.

What can I learn?

Smart Systems

Careers

Industrial metrology
Manufacturing automation
Nuclear reactor control
Search and surveillance

Smart systems specific curriculum

1. Analog and digital circuits
2. Thermal systems design
3. Applied mechanics
4. Fundamentals of physical optics
5. Engineering metrology: fundamentals and applications
6. Signals and systems for engineering

Core curriculum

1. Optics and photonics engineering
2. Classical mechanics
3. Electronic devices and circuits
4. Systems control

Some of the

COMPANIES

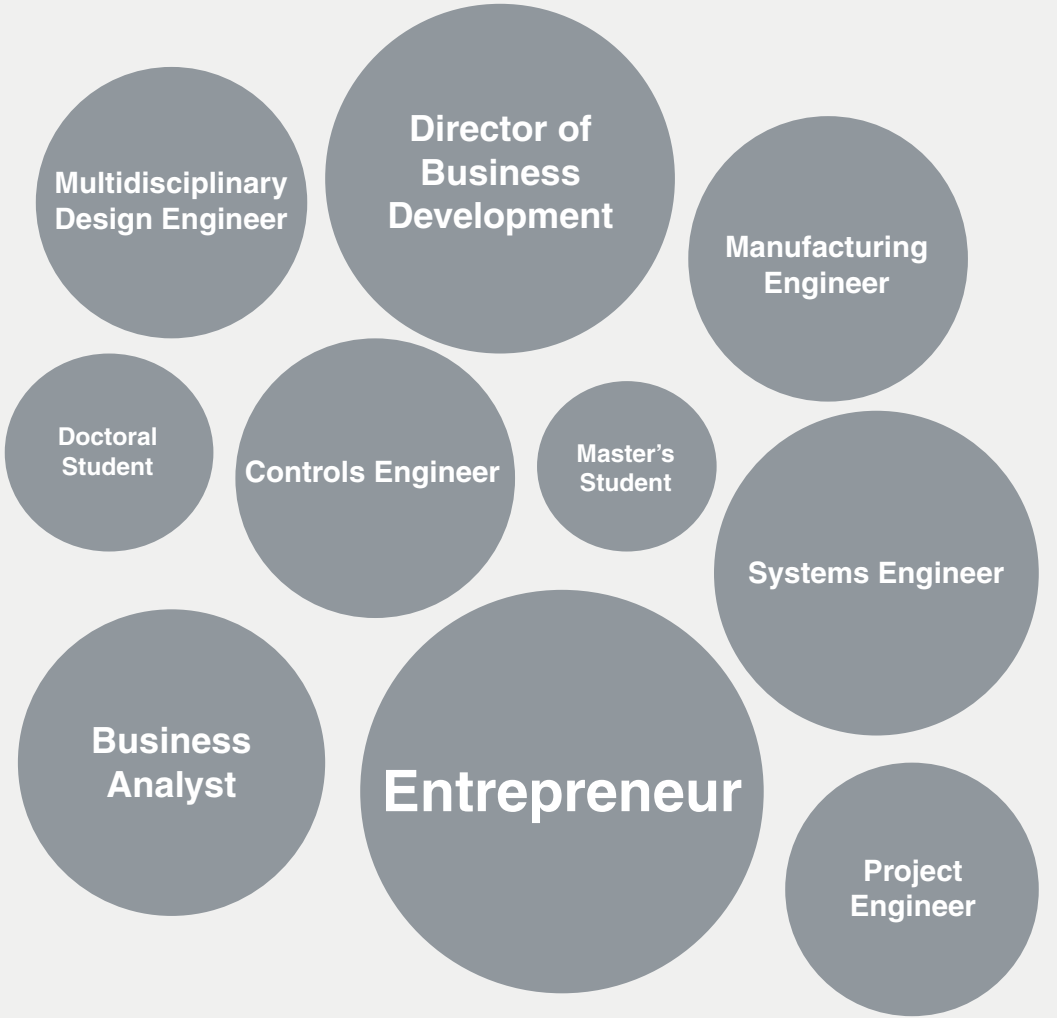
where our alumni work

Some of the

CAREERS

our alumni now have

[For a comprehensive list, see our past Employment Reports on our Co-op and Careers webpage under Resources]

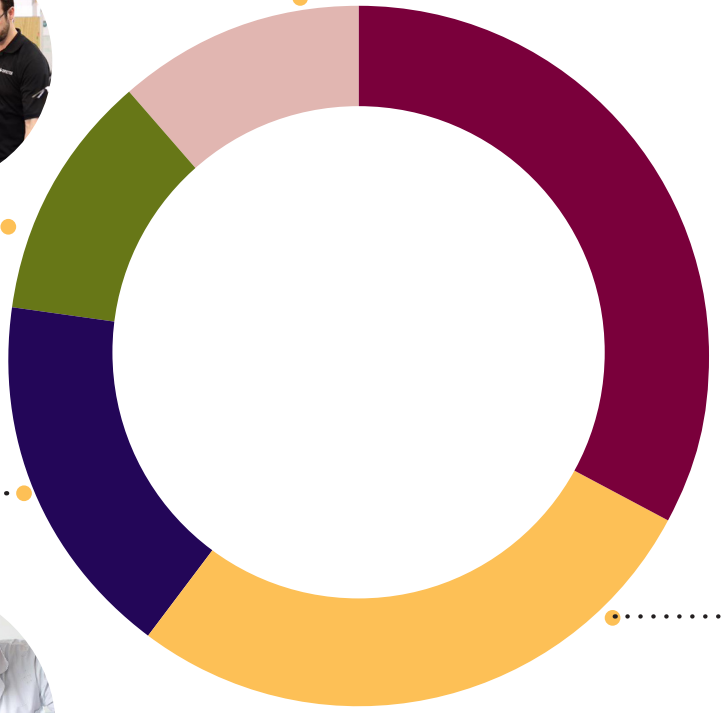


Where do our graduates end up?

11%
Technician/
Consultant

11%
Start-up
Company

Image Credit: The Forge Hamilton
info@theforgehamilton.ca



33%
Manufacturing /
Product Development

17%
Graduate
Studies

28%
Energy Industry

NOTES:

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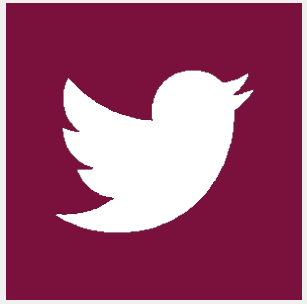

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