

SECTION 13:

SCHOOL OF ENERGY SYSTEMS AND NUCLEAR SCIENCE

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Website:

<http://nuclear.uoit.ca>

13.1 Degrees offered

Bachelor of Applied Science (Honours) in Nuclear Power - BASC (Hons) (Students are not currently being admitted to this program)

Bachelor of Engineering (Honours) in Energy Systems Engineering - BEng (Hons) (Students are not currently being admitted to this program)

Bachelor of Engineering (Honours) in Nuclear Engineering - BEng (Hons)

13.2.4 Degree requirements

To be eligible for the BAsc (Hons) degree in Nuclear Power, students must successfully complete 120 credit hours, including all courses outlined below. For course descriptions, see section 16.

YEAR 1

Semester 1 (15 credit hours)

EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

Semester 2 (15 credit hours)

CHEM 1800U Chemistry for Engineers
ENGR 1200U Introduction to Programming
ENVS 1000U Environmental Science
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

Semester 1 (15 credit hours)

EDUC 1200U History of Science and Technology
ENGR 2220U Structure and Properties of Materials
ENGR 2500U Introduction to Nuclear Physics
ENGR 2860U Fluid Mechanics
MATH 2860U Differential Equations for Engineers

Semester 2 (15 credit hours)

BUSI 2000U Collaborative Leadership
ENGR 2790U Electric Circuits
ENGR 2640U Thermodynamics and Heat Transfer
ENGR 2950U Radiation Protection
ENGR 3820U Nuclear Reactor Kinetics

YEAR 3

Semester 1 (15 credit hours)

BUSI 3700U Strategic Management for Professionals
ENGR 2360U Electric Power Systems
ENGR 3540U Nuclear Steam Supply Systems
ENGR 3560U Radioactive Waste Management
ENGR 4640U Nuclear Plant Operation

Semester 2 (15 credit hours)

ENGR 2330U Mechanical Equipment and Systems
ENGR 3360U Engineering Economics
ENGR 3550U Nuclear Plant Steam Utilization Systems
ENGR 4730U Reactor Control
Technical elective*

YEAR 4

Semester 1 (15 credit hours)

BUSI 2603U Introduction to Operations Management
ENGR 3530U Safety and Quality Management
ENGR 4360U Nuclear Plant Electric and Auxiliary Systems
ENGR 4550U Thesis Project I
Technical elective*

Semester 2 (15 credit hours)

BUSI 2604U Introduction to Project Management and Supply Chain Management
ENGR 4370U Nuclear Plant Safety
ENGR 4560U Thesis Project II
ENGR 4810U Nuclear Fuel Cycles
Technical elective*

13.3 Program information - Bachelor of Engineering (Honours) in Energy Systems Engineering - BEng (Hons)

Students are not currently being admitted to this program.

13.3.1 General information

Students in the Honours Bachelor of Engineering in Energy Systems Engineering will learn the skills to design and develop tomorrow's energy systems. This degree program is the first stand-alone program of its kind in Canada. The program was developed to meet the rapidly increasing demand for graduates with the knowledge and skills required to help Canada and the rest of the world meet the terms of the Kyoto agreement, while ensuring that the growing consumption of energy can be satisfied economically and with minimum impact on the environment.

The curriculum provides students with an understanding of the principles and applications of the full range of energy systems and technologies from traditional fossil-fuelled energy systems to alternative energy technologies. This includes the production, storage, distribution and utilization of energy.

13.3.2 Admission requirements

See section 13.2.2.

13.3.3 Careers

Graduates will be well prepared to work with systems that involve the generation, transmission or utilization of energy. Career opportunities are increasing for graduates in industry, government and non-government organizations. Graduates may also choose to start their own energy enteriza(choose enn TI)]TJuegraduates wtudees.]TJ /F4 1 Tf 0 GTis program.was developed to

YEAR 1

Semester 1 (18 credit hours)

CHEM 1010U Chemistry I
EDUC 1050U Technical Communications
ENGR 3200U Engineering Graphics and Design
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

Semester 2 (18 credit hours)

CHEM 1020U Chemistry II
ENGR 1200U Introduction to Programming
ENGR 3530U Safety and Quality Management
ENVS 1000U Environmental Science
MATH 1020U Calculus II
PHY 1020U Physics II

YEAR 2

Semester 1 (18 credit hours)

BUSI 2000U Collaborative Leadership
EDUC 1200U History of Science and Technology
ENGR 2140U Problem Solving, Modelling and Simulation
ENGR 2220U Structure and Properties of Materials
ENGR 2860U Fluid Mechanics
MATH 2860U Differential Equations for Engineers

Semester 2 (18 credit hours)

EDUC 1470U Impact of Science and Technology on Society
ENGR 2010U Thermodynamic Cycles
ENGR 2330U Mechanical Equipment and Systems
ENGR 2790U Electric Circuits
MATH 2810U Advanced Engineering Mathematics or
MATH 2070U Numerical Methods
STAT 2800U Statistics and Probability for Engineers

YEAR 3

Semester 1 (18 credit hours)

ENGR 2360U Electric Power Systems
ENGR 3260U Introduction to Energy Systems
ENGR 3280U Fundamentals of Computer-Aided Design Tools
ENGR 3350U Control Systems
ENGR 3930U Heat Transfer
Liberal studies elective*

Semester 2 (15 credit hours)

ENGR 3360U Engineering Economics
ENGR 3380U Strength of Materials
ENGR 3730U Solar Energy Technologies
ENGR 3830U Wind Energy Systems
ENGR 3840U Fuel Cell Design

YEAR 4

Semester 1 (15 credit hours)

BUSI 3700U Strategic Management for Professionals
ENGR 4410U Fossil Fuel Energy Conversion
ENGR 4470U Hydrogen Power Systems
ENGR 4660U Risk Analysis Methods
ENGR 4994U Thesis Design Project I

Semester 2 (15 credit hours)

ENGR 4460U Nuclear Power Systems
ENGR 4480U Emerging Energy Systems
ENGR 4530U Hydroelectric Power
ENGR 4760U Ethics, Law and Professionalism for Engineers
ENGR 4998U Thesis Design Project II

13.4 Program information - Bachelor of Engineering (Honours) in Nuclear Engineering - BEng (Hons)

13.4.1 General information

The four-year Honours Bachelor of Engineering in Nuclear Engineering program was designed to meet a worldwide need for graduates in the field of nuclear engineering. Although the primary focus of the program is nuclear power plant engineering, the curriculum is sufficiently broad-based that graduates will be well qualified for careers in many applications of nuclear technology and energy related fields.

The first two years of study provide students with a solid foundation in the fundamentals of mathematics and sciences, with years three and four concentrating on engineering sciences and specific nuclear engineering courses.

Students who choose the Nuclear Engineering and Management take two semesters of business and management courses after successfully completing third year. The regular fourth year of the engineering program is then taken in year five of the program.

Learning takes place in a variety of settings including lectures, tutorials, field visits, laboratories and via computer simulation-the most extensive computer simulation of nuclear power plants of any engineering program in Ontario.

Electives may be taken from other programs in the engineering and science faculties, health physics and radiation science, and liberal arts, with complementary studies in collaborative leadership, economics, ethics and law, and strategic management.

Students develop management, interpersonal, problem-solving, and holistic thinking skills while gaining a comprehensive knowledge of nuclear engineering science and design, as well as the latest developments in this field.

13.4.2 Admission requirements

See section 13.2.2

13.4.3 Work placement/internship opportunities

The university's proximity to the Pickering and Darlington nuclear power plants and

Potential employers include utilities, service companies, government agencies, and research and design institutions, both in Canada and abroad. Major Canadian utilities and engineering companies that design, operate and service nuclear power plants are looking for a reliable supply of nuclear engineers.

13.4.5 Professional designation

See section 13.3.4.

13.4.6 Degree requirements

To be eligible for the BEng (Hons) degree in Nuclear Engineering, students must

YEAR 3

Semester 1 (18 credit hours)

ENGR 2790U Electric Circuits
ENGR 3280U Fundamentals of Computer-Aided Design Tools
ENGR 3570U Environmental Effects of Radiation
ENGR 3930U Heat Transfer
ENGR 4640U Nuclear Plant Operation
Liberal studies elective*

Semester 2 (18 credit hours)

ENGR 3360U Engineering Economics**
ENGR 3380U Strength of Materials
ENGR 3740U Scientific Instrumentation
ENGR 4610U Corrosion for Engineers
ENGR 4730U Reactor Control
ENGR 4780U Nuclear Reactor Design

**Students in an Engineering and Management program take BUSI 1700U Introduction to Entrepreneurship, or a similar business and management course approved by the School of Energy Systems and Nuclear Science, in place of ENGR 3360 Engineering Economics.

YEAR 4

Semester 1 (18 credit hours)

BUSI 3700U Strategic Management for Professionals
ENGR 4620U Radioactive Waste Management Design
ENGR 4660U Risk Analysis Methods
ENGR 4700U Nuclear Plant Design and Simulation
ENGR 4994U Thesis Design Project I
Engineering science elective*

Semester 2 (18 credit hours)

ENGR 4520U Nuclear Plant Safety DesignYEAknoshilts Aknosy 3

Semester 1 (18 credit hours)

ENGR 2790U Electric Circuits

13.5 Program information – Bachelor of Engineering and Management (Honours) in Nuclear Engineering

13.5.1 General information

The engineering and management combination program meets the rapidly increasing need for engineers with the leadership skills to succeed in business and management.

Students study the complete engineering program, and also gain critical management skills in key areas of business including accounting, finance, operations, human resources and marketing.

Students in this program take two semesters of business and management courses for 30 credit hours after successfully completing third year. The regular fourth year of the engineering program is then taken in year five of the program. The two semesters of business and management courses may be taken at other years in the program with permission.

Semester 2 (15 credit hours)

BUSI 2170U Managerial Accounting

BUSI 2202U Marketing II

BUSI 2312U Introduction to Human Resources Management

BUSI 2402U Finance II

ENGR 2350U Engineering Operations and Project Management II**

Students take the fourth year of the appropriate engineering program in year five.

**In 2007-08, the courses ENGR 2340U Engineering Operations and Project Management I and ENGR 2350U Engineering Operations and Project Management II may not run and instead may be replaced by BUSI 2603U and BUSI 2604U, respectively.

Students should consult the School of Energy Systems and Nuclear Science to determine which courses are running. The two semesters of business and management courses may be taken at other years in the program with permission.

13.6 Program information Bachelor of Science (Honours) in Health Physics and Radiation Science**13.6.1 General information**

The four-year Honours Bachelor of Science in Health Physics and Radiation Science program provides an advanced science curriculum with a strong emphasis on safety aspects of radiation, as well as the application of technologies in the health care field where the expanding use of imaging technologies is creating a demand for graduates.

The curriculum is designed to provide students with a comprehensive knowledge of advanced science and applications of radiation protection, as well as the application of radiation technologies to health care, industry and agriculture. The first two years establish the fundamentals in mathematics, physical and biological sciences, and technology. In year three, students learn the fundamentals of imaging, and how radiation techniques are used in a wide range of applications. Fourth year allows for specialization and includes two thesis projects.

Students in the Bachelor of Science (Honours) in Health Physics and Radiation Science

13.6.4 Careers

There is a growing global demand for health physics and radiation science specialists.

Graduates have many career opportunities, from research to nuclear power plants, as well as in the health care field where an aging population and the use of sophisticated imaging technologies are increasing the demand for such experts.

Graduates can find careers in hospitals and clinics as well as at utilities, service companies, government agencies and research institutions.

13.6.5 Degree requirements - BSc (Hons) in Health Physics and Radiation Science

To be eligible for the BSc (Hons) in Health Physics and Radiation Science, students must successfully complete 132 credit hours including all courses as outlined below. For course descriptions, see section 16.

YEAR 1

Semester 1 (18 credit hours)

CHEM 1010U Chemistry I
EDUC 1050U Technical Communications
EDUC 1200U History of Science and Technology
MATH 1010U Calculus I
MATH 1850U Linear Algebra for Engineers
PHY 1010U Physics I

Semester 2 (18 credit hours)

BIOL 1840U Biology for Engineers
CHEM 1020U Chemistry II
ENGR 1200U Introduction to Programming
MATH 1020U Calculus II
PHY 1020U Physics II
RADI 3530U Introduction to Radiological and Health Physics

YEAR 2

Semester 1 (18 credit hours)

BIOL 2840U Cell and Molecular Biology
BUSI 2000U Collaborative Leadership
CHEM 2020U Introduction to Organic Chemistry
ENGR 2140U Problem Solving, Modelling and Simulation
ENGR 2500U Introduction to Nuclear Physics
MATH 2860U Differential Equations for Engineers

Semester 2 (18 credit hours)

EDUC 1470U Impact of Science and Technology on Society
ENVS 1000U Environmental Science
MATH 2810U Advanced Engineering Mathematics or
MATH 2070U Numerical Methods
RADI 2100U Radiological and Health Physics
RADI 2110U Health Physics Laboratory
STAT 2800U Statistics and Probability for Engineers

YEAR 3

Semester 1 (15 credit hours)

ENGR 2790U Electric Circuits
ENGR 3860U Introduction to Nuclear Reactor Technology
HLSC 1200U Anatomy and Physiology I
RADI 3200U Medical Imaging
RADI 4550U Radiation Detection and Measurement

Semester 2 (15 credit hours)

ENGR 3360U Engineering Economics
ENGR 3740U Scientific Instrumentation
RADI 4220U Radiation Biophysics and Dosimetry
RADI 4440U Radioisotopes and Radiation Machines
Science or engineering elective

YEAR 4

Semester 1 (15 credit hours)

ENGR 3570U Environmental Effects of Radiation
ENGR 4660U Risk Analysis Methods
RADI 4430U Industrial Applications and Radiation Techniques
RADI 4995U Thesis Project I
Liberal studies elective*

Semester 2 (15 credit hours)

RADI 4320U Therapeutic Applications of Radiation Techniques
RADI 4999U Thesis Project II
Senior science OR engineering elective
Senior science OR engineering elective
Liberal studies elective*

***Liberal studies electives**

The dean of the School of Energy Systems Engineering and Nuclear Science or his/her designate must approve courses selected for the liberal studies electives.

13.7 First-year Engineering Transition Program

The objective of the First-year Engineering Transition Program is to provide first-year engineering students with an opportunity, before the start of second year, to complete first-year courses for which they have not obtained credit, to upgrade their grade point average and academic standing, and to improve their preparation for studies in subsequent years.

The program involves a second offering of demanding first-year courses, according to the following schedule:

Winter semester	Summer semester
MATH 1010U Calculus I	MATH 1020U Calculus II
PHY 1010U Physics	PHY 1020U Physics II

At the end of the fall semester, engineering students who have failed or are missing Calculus I (MATH 1010U) or Physics I (PHY 1010U), are encouraged to take the course(s) during the winter semester. Students on academic warning will likely be required to take or repeat the courses which they have not already passed. The follow-up courses, Calculus II (MATH 1020U) and Physics II (PHY 1020U), along with the other above-noted first-year courses, will be offered during the summer semester.

Students who register in and successfully complete the transition program courses will have their academic standing re-evaluated. This re-evaluation will include all the grades received in transition program courses.