Area of Interest: Environmental Science

**Applied Nuclear Science and Radiation Safety (Co-op and Non Co-op Version)**

Ontario College Diploma  
2 Years  
Pembroke Campus  

**Academic Year: 2020/2021**  
**Program Code: 1215X01FPM**

**Our Program**

*Learn how to survey, monitor and control radiation exposure for a career in the nuclear industry.*

The two-year Applied Nuclear Science and Radiation Safety Ontario College Diploma program is the only program of its kind in Canada. In this program, you learn to monitor radiation levels and implement preventive measures critical to ensuring the safety of employees and members of the public, and providing for protection of the environment.

Learn to effectively complete important tasks focusing on radiation safety, such as detecting and measuring radiation levels, mitigating contamination hazards and providing guidance and information to personnel to control contamination and minimize radiation exposure.

Gain theoretical and practical understanding of nuclear operations fundamentals, radiation detection and measurement, instrumentation and techniques, waste management, contamination and decontamination procedures, and incident assessments. Your courses focus on regulatory frameworks and compliance with internationally accepted radiation protection principles.

Learn from nuclear industry professionals who have years of experience. This program benefits from a partnership between Algonquin College and Bruce Power, Ontario’s largest private electricity generating company.

Benefit from the opportunity to complete industry-recognized certifications in this program.

Students also have the option to gain real-world experience through a paid co-operative education (co-op) work term (see Additional Information for more details). Please note that places in the co-op version of the program are subject to availability. Students who elect to apply to the non co-op version of the program may not have the opportunity to transfer to the co-op version at a later date.

Graduates may find employment in:

- nuclear power plants
- nuclear-based research and development facilities
- decontamination/waste storage facilities
- uranium mines/mills
- radiation protection contract companies
- isotope production/refinement facilities
- hospitals that use radioisotopes
- universities with radiological labs
- the oil and gas industry concerned with naturally-occurring radioactive materials (NORMs) management
Graduates may work in roles such as:

- contamination monitor
- radiation protection technician
- radiation surveyor
- health physics technician
- NORMs technician

**SUCCESS FACTORS**

This program is well-suited for students who:

- Perform well both individually and in a team environment.
- Possess strong critical-thinking and analytical skills.
- Use systematic approaches to problem-solve and to follow procedures.
- Have an appreciation for precise and accurate work.
- Possess excellent communication skills and interpersonal abilities.
- Possess strong mathematical skills.
- Value the importance of and take responsibility for safety in the workplace.

**Employment**

Graduates may find employment as contamination monitors, radiation protection technicians, radiation surveyors, health physics technicians, radiation safety officers and NORMs technicians.

**Learning Outcomes**

The graduate has reliably demonstrated the ability to:

- Operate radiation detection and monitoring equipment to accurately detect and measure radiation fields and contamination.
- Interpret and follow radiation safety plans and procedures consistent with current research, regulations and industry standards.
- Anticipate and assess radiological and operational hazards in order to recommend appropriate mitigation strategies and contingency plans for radiological protection and occupational safety.
- Respond to changing radiological conditions in accordance with regulatory requirements.
- Communicate radiation hazards and safety requirements to all levels of personnel.
- Assess the health risks attributed to internal and external radiological exposures.
- Resolve radiation protection issues through the application of scientific principles to maintain or restore optimal safety for workers, the public and the environment.
- Promote Canadian Deuterium Uranium (CANDU) systems information to support safe operations of the reactor and reactor systems.
- Calibrate radiological and industrial detection and safety systems to required specifications.
- Select and apply operational and radiological risk mitigation and contingency strategies to radiological work planning.
- Apply the principle of As Low As Reasonably Achievable (ALARA) to established national
• Apply the principle of As Low As Reasonably Achievable (ALARA) to established national and international radiation protection standards.

• Identify and apply discipline-specific practices that contribute to the local and global community through social responsibility, economic commitment and environmental stewardship.

### Program of Study

<table>
<thead>
<tr>
<th>Level: 01</th>
<th>Courses</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAT7669</td>
<td>Microcomputer Applications for Radiation Safety</td>
<td>28.0</td>
</tr>
<tr>
<td>ENL7777</td>
<td>Communications I</td>
<td>42.0</td>
</tr>
<tr>
<td>GED7666</td>
<td>Human Performance</td>
<td>42.0</td>
</tr>
<tr>
<td>MAT7709</td>
<td>Mathematics for Radiation Safety</td>
<td>56.0</td>
</tr>
<tr>
<td>SAF7602</td>
<td>Radiation Protection</td>
<td>42.0</td>
</tr>
<tr>
<td>SCI7615</td>
<td>Sciences for Understanding Radiation Theory</td>
<td>56.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level: 02</th>
<th>Courses</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY7016</td>
<td>Fundamentals of Physics</td>
<td>42.0</td>
</tr>
<tr>
<td>SAF7603</td>
<td>Instrumentation I</td>
<td>42.0</td>
</tr>
<tr>
<td>SAF7604</td>
<td>Radiological Regulations and Requirements</td>
<td>42.0</td>
</tr>
<tr>
<td>SAF7613</td>
<td>Instrumentation II</td>
<td>42.0</td>
</tr>
<tr>
<td>SAF7616</td>
<td>Contamination Control</td>
<td>42.0</td>
</tr>
<tr>
<td>SAF7617</td>
<td>Site Systems and Work Planning</td>
<td>42.0</td>
</tr>
<tr>
<td>SAF7618</td>
<td>Electrical Science and Systems</td>
<td>42.0</td>
</tr>
<tr>
<td>WKT7108</td>
<td>Preparation for Work</td>
<td>28.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level: 03</th>
<th>Courses</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENL7676</td>
<td>Technical Communication</td>
<td>42.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Co-op: 01</th>
<th>Courses</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>WKT7116</td>
<td>Co-op Education Work Experience</td>
<td>0.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level: 03</th>
<th>Courses</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT7711</td>
<td>Introduction to Health Physics</td>
<td>42.0</td>
</tr>
<tr>
<td>SAF7631</td>
<td>Equipment Calibration and Maintenance</td>
<td>28.0</td>
</tr>
<tr>
<td>SAF7632</td>
<td>Radiological Sampling Methodology</td>
<td>42.0</td>
</tr>
<tr>
<td>SAF7633</td>
<td>Radiological Incident Assessment</td>
<td>42.0</td>
</tr>
<tr>
<td>SCI7617</td>
<td>Science for the Nuclear Industry</td>
<td>56.0</td>
</tr>
</tbody>
</table>

**Gen Ed On-line Elective: choose 2 Courses**

<table>
<thead>
<tr>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>42.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSN2001</td>
</tr>
<tr>
<td>ENL1726</td>
</tr>
<tr>
<td>ENV0002</td>
</tr>
<tr>
<td>GED5002</td>
</tr>
<tr>
<td>GED5003</td>
</tr>
<tr>
<td>GED5004</td>
</tr>
<tr>
<td>GED5005</td>
</tr>
<tr>
<td>GED5006</td>
</tr>
<tr>
<td>GED5300</td>
</tr>
<tr>
<td>GED6022</td>
</tr>
<tr>
<td>GED7019</td>
</tr>
<tr>
<td>GEN1957</td>
</tr>
<tr>
<td>GEN2007</td>
</tr>
<tr>
<td>HIS0001</td>
</tr>
<tr>
<td>HOS2228</td>
</tr>
<tr>
<td>LIB1982</td>
</tr>
<tr>
<td>42.0</td>
</tr>
</tbody>
</table>
Fees for the 2020/2021 Academic Year

Tuition and related ancillary fees for this program can be viewed by using the Tuition and Fees Estimator tool at [http://www.algonquincollege.com/fee-estimator](http://www.algonquincollege.com/fee-estimator)

Further information on fees can be found by visiting the Registrar’s Office website at [http://www.algonquincollege.com/ro](http://www.algonquincollege.com/ro)

Fees are subject to change.

Additional program-related expenses include:

- Books and supplies cost approximately $1,000 for the program duration and can be purchased in the campus bookstore.
- In addition, students are required to have their own electronic device such as a hybrid tablet, which will cost $600 to $900.

Students are also required to take 10 online Industry certificates with approximate cost of $550 for all 10 industry certificates.

Admission Requirements for the 2021/2022 Academic Year

College Eligibility

- Ontario Secondary School Diploma (OSSD) or equivalent. Applicants with an OSSD showing senior English and/or mathematics courses at the Basic Level, or with Workplace or Open courses will be tested to determine their eligibility for admission; **OR**
  - Academic and Career Entrance (ACE) certificate; **OR**
  - General Educational Development (GED) certificate; **OR**
  - Mature Student status (19 years of age or older and without a high school diploma at the start of the program). Eligibility may be determined by academic achievement testing for which a fee of $50 will be charged.

Program Eligibility

- English, Grade 12 (ENG4C or equivalent) with a 60% or higher.
- Mathematics, Grade 12 (MAP4C equivalent) with a minimum grade of 65%.
- Physics, Grade 12 (SPH4C or equivalent) with a grade of 65% or higher OR Chemistry, Grade 11 or 12 with a grade of 65% or higher.

- Applicants with international transcripts must provide proof of the subject specific
• Applicants with international transcripts must provide proof of the subject specific requirements noted above and may be required to provide proof of language proficiency. Domestic applicants with international transcripts must be evaluated through the International Credential Assessment Service of Canada (ICAS) or World Education Services (WES).

• IELTS-International English Language Testing Service (Academic) Overall band of 6.5 with a minimum of 6.0 in each band OR TOEFL-Internet-based (iBT)-overall 88, with a minimum of 22 in each component: Reading: 22; Listening: 22; Speaking: 22; Writing: 22.

Should the number of qualified applicants exceed the number of available places, applicants will be selected on the basis of their proficiency in English and mathematics.

Admission Requirements for 2020/2021 Academic Year

College Eligibility

• Ontario Secondary School Diploma (OSSD) or equivalent. Applicants with an OSSD showing senior English and/or mathematics courses at the Basic Level, or with Workplace or Open courses will be tested to determine their eligibility for admission; OR Academic and Career Entrance (ACE) certificate; OR

• General Educational Development (GED) certificate; OR

• Mature Student status (19 years of age or older and without a high school diploma at the start of the program). Eligibility may be determined by academic achievement testing for which a fee of $50 will be charged.

Program Eligibility

• English, Grade 12 (ENG4C or equivalent) with a 60% or higher.

• Mathematics, Grade 12 (MAP4C equivalent) with a minimum grade of 65%.

• Physics, Grade 12 (SPH4C or equivalent) with a grade of 65% or higher OR Chemistry, Grade 11 or 12 with a grade of 65% or higher.

• International applicants must provide proof of the subject specific requirements noted above along with proof of either: (IELTS / TOEFL) IELTS-International English Language Testing Service (Academic) Overall band of 6.5 with a minimum of 6.0 in each band; OR TOEFL-Internet-based (iBT)-overall 88, with a minimum of 22 in each component: Reading: 22; Listening: 22; Speaking: 22; Writing: 22.

• Applicants with international transcripts must provide proof of the subject specific requirements noted above and may be required to provide proof of language proficiency.

Should the number of qualified applicants exceed the number of available places, applicants will be selected on the basis of their proficiency in English and mathematics.

Application Information

APPLIED NUCLEAR SCIENCE AND RADIATION SAFETY
Program Code 1215X03FPM

Applications to full-time day programs must be submitted with official transcripts showing completion of the academic admission requirements through:

ontariocolleges.ca
60 Corporate Court
Guelph, Ontario
N1G 5J3
1-888-892-2228

Students currently enrolled in an Ontario secondary school should notify their Guidance Office prior to their online application at http://www.ontariocolleges.ca/

Applications for Fall Term and Winter Term received by February 1 will be given equal consideration.
Applications received after February 1 will be processed on a first-come, first-served basis as long as places are available.

International applicants please visit this link for application process information: https://algonquincollege.force.com/myACint

For further information on the admissions process, contact:

Registrar`s Office Algonquin College in the Ottawa Valley
1 College Way
Pembroke, ON
K8A0C8
Local: 613-735-4700
Toll-free 1-800-565-4723
TTY: 1-866-620-3845
Fax: 613-735-4739
https://www.algonquincollege.com/pembroke

Additional Information

Programs at Algonquin College are Bring Your Own Device (BYOD). To see the BYOD requirements for your program, please visit: http://www7.algonquincollege.com/byod.

Apply directly to the co-op or non co-op version of this program through OntarioColleges.ca or our International Application Portal.

Cooperative education (Co-op) allows students to integrate their classroom learning with a real-world experience though paid work terms. Two academic terms prior to the cooperative education work term, students are required to actively participate in and successfully complete the self-directed co-op online readiness activities and in-person workshops.

Students must actively conduct a guided, self-directed job search and are responsible for securing approved program-related paid co-op employment. Students compete for co-op positions alongside students from Algonquin and other Canadian and international colleges and universities. Algonquin College`s Co-op Department provides assistance in developing co-op job opportunities and facilitates the overall process, but does not guarantee that a student will obtain employment in a co-op work term. Co-op students may be required to re-locate to take part in the co-op employment opportunities available in their industry and must cover all associated expenses; e.g., travel, work permits, visa applications, accommodation and all other incurred expenses.

Co-op work terms are typically 14 weeks in duration and are completed during a term when students are not taking courses.

International students enrolled in a co-op program are required by Immigration, Refugees and Citizenship Canada (IRCC) to have a valid Co-op/Internship Work Permit prior to commencing their work term. Without this document, International students are not legally eligible to engage in work in Canada that is a mandatory part of an academic program.

For more information, please visit https://www.algonquincollege.com/coop.

For health and safety reasons, agencies may have restrictions on accepting pregnant women and women who are breastfeeding. For details on study-work progressions for specific programs, please visit http://www.algonquincollege.com/coop.

Prior Work Experience

Applicants with prior education or industry experience related Nuclear Science and/or Radiation Safety can apply for advanced placement (course credits) through the Algonquin College Office of Prior Learning Assessment and Recognition (PLAR). This Office utilizes assessment standards of the Canadian Association for Prior Learning Assessment (CAPLA). The requirements for PLAR course credits vary from a challenge exam to a complete portfolio relating experience and other training to the relevant Applied Nuclear Science and Radiation Safety Ontario College Diploma course learning objectives. PLAR course credits can be awarded for up to a maximum of 75% of program hours. See more at: http://www.algonquincollege.com/plar

Advanced Standing
Graduates from the Radiation Safety Ontario College Certificate within the last five years are eligible to apply for advanced standing in the Applied Nuclear Science and Radiation Safety Diploma program for up to 13 courses. Please note that advanced standing towards the diploma may be granted for courses completed with minimum of 70% in the Radiation Safety Ontario College Certificate.

Industry-related certifications

Students will be required to complete 10 certifications, by no later than April 30th of their last year of study, 6 of which are compulsory and 4 are based on student interest. All are taken from a master list of certifications which will approximately cost $550 for all 10. If students have obtained certifications prior to entering the program and those certifications are valid, they will count towards the required 10.

Additional Notes

A Criminal Records Check (CRC) may be required by certain agencies. You are required to supply information for the facilities to complete their own CRC and security clearances. In some cases, you are responsible for obtaining a CRC from your local Police Department.

Course Descriptions

DAT7669 Microcomputer Applications for Radiation Safety

Competency using a variety of computer applications is an essential skill sought by employers. Topics covered include the use of email, word processing, Internet searching and presentation software and the management of data using spreadsheets. The application of typical software used in radiation safety are also discussed and applied in depth.

Prerequisite(s): none
Corerequisite(s):none

DSN2001 History of Design

Visual communications and graphic design have played a key role in the evolution of communication through a number of historical and social art movements. Graphic design has had a major impact on civilizations over the ages. Students explore graphic design's many influences, including the invention of writing and alphabets, the origins of printing and typography, Victorian, Art Nouveau, Modern Art, and Postmodern design, to the present-day computer revolution and its influence on the many forms of contemporary visual communication that surround us every day.

Prerequisite(s): none
Corerequisite(s):none

ENL1726 Symbols, Text and Meaning

Symbols and text are used to express, evoke, and manipulate an entire range of human emotions and reactions. In this interactive, discussion-based course, students will explore historical and contemporary approaches to using symbols, text, and language in conceptual and contemporary art, graphic design and advertising, poetry and lyrics, and in online technology. Through discussion, analysis, informal debate, and critical thinking, students will explore how symbols and text influence individuals, society and culture.

Prerequisite(s): none
Corerequisite(s):none

ENL7676 Technical Communication

Effective communication is an essential skill in the field of applied nuclear science. Students develop technical communication skills, which include writing clear technical and other workplace documents; presenting technical information orally; locating, evaluating, and documenting technical information; interpreting and reframing workplace safety plans and processes; interpreting and creating effective visuals; interacting effectively with colleagues; and other communication skills that technicians require in today's applied nuclear science workplace.
Prerequisite(s): ENL7777
Corequisite(s): none

**ENL7777 Communications I**

Communication remains an essential skill sought by employers, regardless of discipline or field of study. Using a practical, vocation-oriented approach, students focus on meeting the requirements of effective communication. Students practise writing, speaking, reading, listening, locating and documenting information, and using technology to communicate professionally. Students develop and strengthen communication skills that contribute to success in both educational and workplace environments.

Prerequisite(s): none
Corequisite(s): none

**ENV0002 Environmental Citizenship**

Environmental citizenship is based on the principles of national citizenship, yet it goes beyond political borders to emphasize global environmental rights and responsibilities. An environmental citizen is committed to learning more about the environment and to taking responsible environmental action. Through a combination of interactive activities, assignments and discussions, students learn how they are personally connected with current environmental issues. Students are also encouraged to adopt attitudes and behaviours that foster global environmental responsibility.

Prerequisite(s): none
Corequisite(s): none

**GED1215 General Education Elective**

Students choose one course, from a group of general education electives, which meets one of the following five theme requirements: Arts in Society, Civic Life, Social and Cultural Understanding, Personal Understanding, and Science and Technology.

Prerequisite(s): none
Corequisite(s): none

**GED5002 Victimology**

An increased awareness of the ripple effect of crime has given rise to victimology as a significant field of study. Students investigate victims of crime and the impact that crime has on their lives, their families and society by studying the history of victimology and the victims’ movement, the nature and extent of victimization, its emerging theories and resulting legislation. In addition victims’ services, accessibility to services, rights of the victim and the victim in the criminal justice system are examined. Students also learn about crime in the workplace, schools, and campuses and the importance of recognizing those at risk.

Prerequisite(s): none
Corequisite(s): none

**GED5003 The Science of Play**

Toys and games, key components of play, have evolved from homemade trinkets to highly engineered items in a multi-billion-dollar industry. Students explore the connections between technology and play, specifically the benefits, drawbacks and ethical implications of toy and game design. Case studies allow students to consider familial, cultural, sociological, and other influences upon toy and game design over the last century. Through discussion, analysis and workshops, students move towards designing their own toy or game, or modifying an existing one.

Prerequisite(s): none
Corequisite(s): none
GED5004 Living Green
The need to lead healthy, environmentally conscious lives is increasingly important. Students acquire the practical knowledge and skills required to explore current environmental challenges and identify personal plans for living in an environmentally responsible manner. Through a combination of assignments, discussion boards, and quiz work, students investigate the history and development of current environmental concerns, the environmental impact of our choices and behaviours, and strategies involved in living green.
Prerequisite(s): none
Corequisite(s): none

GED5005 Greek Mythology
Students explore intriguing characters, important places and famous myths of Classical Greece. By examining a variety of popular myths, students discover how the Ancient Greeks crafted narratives of gods, goddesses, monsters, and heroic figures to make sense of their lives and the world around them. Using examples from art, science, and industry, students examine how these epic stories from oral tradition have endured and continue to influence contemporary society.
Prerequisite(s): none
Corequisite(s): none

GED5006 World Religions
In Canada, society embraces people from many cultures of the world. By exploring different religious beliefs about the world, the individual, the meaning of life and death, and how individuals are encouraged to conduct themselves, students begin to appreciate the underlying forces that shape followers’ lives. Students explore the history and basic teachings of six of the major religions of the world: Hinduism, Buddhism, Judaism, Christianity, Islam, and the Baha’i Faith. Each religion's distinctive features are highlighted, while their similarities and shared values are examined. Students have the opportunity to broaden their worldview through an exposure to divergent religious traditions.
Prerequisite(s): none
Corequisite(s): none

GED5300 The Science of Everyday Life
The mysteries of science surround us constantly and play a significant role in everyone’s daily life regardless of their level of awareness. Familiarity with the basic concepts of science in disciplines such as biology, physics, and chemistry, helps students better understand the world in which they live, the attitudes and opinions of those with whom they interact, and the reasons why many things happen. By examining everyday occurrences, students are introduced to scientific ways of thought and to problem-solving methods used by scientists. A background in science and math is not required.
Prerequisite(s): none
Corequisite(s): none

GED6022 A Sense of Humour
Humour is a universal tool of communication and social influence. Students survey the development, use, and value of humour in Canadian visual and creative arts. Varieties of humour, such as irony, satire and farce are positioned in the context of Canadian culture to enhance the student’s appreciation of humour and self-awareness.
Prerequisite(s): none
Corequisite(s): none

GED7019 Becoming an Entrepreneur: Is It for Me?
Do you have what it takes to be an entrepreneur? From government incentive and mentoring
programs, to courses, training programs and reality television, it is clear that there is a growing need for people who can transform innovative ideas into viable products. Through self-evaluation, a variety of decision-making models and exposure to the experiences of local entrepreneurs, students acquire the necessary knowledge and tools to determine if entrepreneurship is a direction they would like to explore.

Prerequisite(s): none  
Corerequisite(s): none

**GED7666 Human Performance**

Understanding how humans perform is critical for the safe and efficient operation of industrial facilities as it is a systematic means to ensure that human error is minimized. The tools and processes used in the industry to help reduce the likelihood of human error are reviewed. Students practise effective three-way communication skills, the importance of conservative decision making, the phonetic alphabetic and other human performance tools. Students also engage in problem solving, group decision making and building group cohesiveness. Through group work and individual study, students rehearse the fundamentals of human performance and how to efficiently communicate, both verbally and in writing, so that the possibilities of human error and ambiguity are minimized.

Prerequisite(s): none  
Corerequisite(s): none

**GEN1957 Science Fiction**

Science fiction is both a major genre of popular entertainment and an effective mode of social commentary. Students explore the formal conventions and the history of the genre, analyze a representative range of science fiction, and develop their critical appreciation of the role and place of science fiction in society. In addition to writing reflective and analytical assignments, students have an opportunity to create their own piece of science fiction.

Prerequisite(s): none  
Corerequisite(s): none

**GEN2007 Community Service**

Volunteerism not only benefits a community; it can broaden the worldview of the volunteer. Students who give their time and energy to a particular cause, gain an opportunity to reflect on the value of the volunteer in contemporary society. Through research and discussion, students consider different types of volunteer settings, trace the history of volunteer organizations, examine the various roles volunteers play within society and reflect on ethical issues.

Prerequisite(s): none  
Corerequisite(s): none

**HIS0001 Saints and Heroes: Shining a Spotlight on the 'Dark Ages', Europe A.D. 410-1096**

When the mighty Roman Empire began to collapse, it was attacked from all directions by Barbarian armies. The resulting turmoil caused Europe to sink into a period of social and political upheaval known as The Dark Ages. However, during these troubled times, extraordinary warriors and missionaries emerged whose profound influence has played a vital role in shaping what has become our modern world. Students examine the social, political, intellectual, and economic history of this era and explore its enduring impact on modern Western society.

Prerequisite(s): none  
Corerequisite(s): none

**HOS2228 Wine, Food and Culture**

An understanding of culture can be discovered by exploring eating and drinking customs. Students experience a virtual global tour, exploring culture, history and traditions through the lens of wine and food. Students acquire a sense of the customs of their culture and those of others. Through comparison, observation, discussion, and reflection, students discover something found in all
cultures: the importance of food and drink.

Prerequisite(s): none
Corerequisite(s): none

**LIB1982 Reading for Recreation**

Reading gives us knowledge and new ideas to draw from in the future. It tones the mind in ways similar to the way exercise tones the body. As a result, time spent in reading for recreation has benefits beyond the immediate appreciation of the text. Students examine appeal factors of various genres of fiction and non-fiction by reviewing the history and classics of each genre, considering the therapeutic values of reading, and examining recent trends in online reading and publishing.

Prerequisite(s): none
Corerequisite(s): none

**MAT7709 Mathematics for Radiation Safety**

Radiation Protection Technicians need to perform and provide accurate calculations and assessments to protect the health and safety of themselves and work colleagues. Students develop essential math skills including scientific notation, basic equations, logarithms, geometry and graphing to solve fundamental math problems. Through group discussion and practical exercises, students use a variety of problem solving, research and math skills to find solutions for radiation protection related problems.

Prerequisite(s): none
Corerequisite(s): none

**MAT7711 Introduction to Health Physics**

Radiation Protection Technicians need to perform accurate and appropriate calculations in order to anticipate and assess safety hazards in order to protect the health and safety of themselves and others in a work environment with radiological hazards. Students apply health physics skills to solve problems related to internal and external dose assessments, shielding requirements, radiation penetration depths, radionuclide identification and statistical analysis. By selecting information from appropriate sources and analyzing that information, students find solutions to practical health physics related problems.

Prerequisite(s): MAT7709 and PHY7016
Corerequisite(s): none

**MGT7330 Trends in Today's Workplace**

In today’s culture of work, every employee needs to be knowledgeable about current trends and issues in the workplace. Students explore emerging issues facing employees in today’s technology-driven workplace and investigate the realities of social networking, diversity in the workplace, and work mobility.

Prerequisite(s): none
Corerequisite(s): none

**MVM8800 The Impact of the Car on North American Culture**

Students explore the social, economic, political, and environmental impact of the automobile on North American lives. Through a combination of assignments, discussion boards, and quiz work, students study the history of the automobile, from its introduction to the present day. Doing so allows students to track the changes the car has introduced to manufacturing, lifestyles, design principles, transportation systems, the environment, labour-management negotiation, and economic organization.

Prerequisite(s): none
Corerequisite(s): none
PHY7016 Fundamentals of Physics

A conceptual understanding of physics is necessary to understand instrumentation, nuclear systems, and nuclear sciences. Students qualitatively and quantitatively explore the topics of forces and motion, energy and simple machines, and hydraulic and pneumatic systems. The underlying physical concepts and principles are emphasized as students gain experience applying them to diverse practical systems.

Prerequisite(s): MAT7709
Corerequisite(s): none

PSi0003 Globalization and Sustainability

The rapid growth of the global economy raises fundamental questions: How do trade and politics affect development and the environment? What are the effects of free trade and the rise of multinational corporations on local cultures? What are the effects of the "clash of cultures" produced by international travel, migration, and new social, collaborative technologies that send film, books, television, music and other "proprietary" content spinning around the world instantly? Is globalization environmentally sustainable? Students examine these and other questions and analyze the day-to-day choices raised by globalization in an increasingly interconnected world.

Prerequisite(s): none
Corerequisite(s): none

RAD2001 Popular Culture

One dictionary definition of popular culture is the "totality of socially transmitted behaviour patterns, arts, beliefs, institutions, and all other products of human work and thought." This definition allows us great freedom and scope. Students examine recent North American popular culture including trends, fads, styles, theories and the cult of the new. By exploring our perceptions of culture and the trivialization of society, students begin to appreciate how the media has relentlessly helped to shape today's values. Through online research, assigned readings, and participation in self-directed learning, students critique popular culture's place in North American society, concentrating on their decade of choice.

Prerequisite(s): none
Corerequisite(s): none

SAF7602 Radiation Protection

Radiation Protection Technicians need to recognize the biological risks associated with radiation hazards and to be able to protect themselves and other workers against these hazards. Students examine how radiation interacts with the human body and explore the biological effects of radiation, including acute and chronic risk factors. Students investigate and evaluate dosage levels with reference to both natural background radiation and humanly produced sources of radiation. Through individual and group efforts, students apply a systematic approach to anticipate and assess biological risk based on current research and standards in order to ensure radiation doses are minimized.

Prerequisite(s): none
Corerequisite(s): none

SAF7603 Instrumentation I

Radiation Protection Technicians require a firm understanding of radiation detection equipment. This ensures that Radiation Protection Technicians are able to assess dose and contamination levels to ensure a safe working environment. Students examine the operational principles and demonstrate competence with ionization chambers, proportional and Geiger counters, scintillation counters and dosimeters. For each type of instrument, students explore, among other aspects, technical and electronic design, operating techniques and calibration. Students select, analyze, and utilize information from a variety of sources to research the principles of operation for a variety of detectors. Students also utilize a systematic and practical approach to a variety of instruments used to detect and measure radiation to industry standards.
SAF7604 Radiological Regulations and Requirements

The Nuclear Safety and Control Act provides the Canadian Nuclear Safety Commission (CNSC) with the authority to regulate the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information in Canada. Radiation Protection staff working at a nuclear facility or with radiation in Canada must be aware of the legislation that governs the safety of staff, the public and the environment. Students examine the core CNSC acts, regulations, policies, standards and guides that are applicable to radiation protection and radiation safety officers. Students also investigate key components of the Occupational Health and Safety Act. Through individual and group efforts, students locate relevant legislation, as it applies to specific safety and radiological concerns, analyze and interpret the information to given circumstances which require effective technical communication.

SAF7613 Instrumentation II

Radiation Safety Technicians need to accurately and efficiently perform radiation surveys for a variety of radiological hazards in order to ensure that there is a safe work environment for themselves and others working with or around radiological or nuclear materials. Students develop practical skills in determining the type and amount of radiation and/or contamination present on systems, people or surfaces. Students perform radiation surveys, fill out radiation logs, determine and apply appropriate tags and signage, and make decisions that reflect industry safety standards. Students work in teams in which they systematically anticipate and assess radiological hazards. Through accurate calculations, students validate and defend their assessments and communicate these findings both verbally and in writing.

SAF7616 Contamination Control

Radiological contamination is one of the paramount hazards in the nuclear industry and requires specially trained personnel to identify, contain and control it, thus ensuring that radiation dose and cross-contamination are minimized. Students develop the practical skills and theoretical knowledge to protect themselves and others in a workplace containing radioactive contamination. Students explain the personnel movement and contamination control measures used in industry and use various radiation instruments, protective equipment, control at the source techniques and basic decontamination practices. Through group and individual work, students apply a programmatic approach to handling contamination. Students utilize a variety of skills to locate and analyze the source of contamination and decide how to best manage it in an industrial environment.

SAF7617 Site Systems and Work Planning

Radiation Protection technicians require working knowledge of systems that may contain radiological hazards within a facility to ensure that they can protect themselves as well as other workers. Students explain the basic nuclear systems in a typical CANDU reactor, the various radiation hazards to anticipate from these systems and the factors that can cause these hazards to change. Students develop a radioactive work plan that includes practical ALARA applications to demonstrate their understanding of the overall radioactive work planning process.
SAF7618 Electrical Science and Systems

Identifying and understanding standard electrical theory is a fundamental requirement for thoroughly understanding radiation detection instrumentation, as well as the operation of a nuclear facility. Students examine the basic concepts associated with AC and DC current, explore the fundamental operating principles of electric circuit components and differentiate the multiple power sources that may be found in an industrial setting. Students systematically select and organize information from a variety of sources and utilize that information to illustrate electrical theory via the correct application of mathematics.

Prerequisite(s): MAT7709
Corerequisite(s): none

SAF7631 Equipment Calibration and Maintenance

Radiation Protection Technicians need to ensure that their equipment is correctly calibrated in order to ensure measurements are accurate for the health and safety of personnel. Through the application of mathematics and information from a variety of sources, students apply the methodology behind equipment calibration and maintenance.

Prerequisite(s): SAF7603
Corerequisite(s): none

SAF7632 Radiological Sampling Methodology

Radiation Protection personnel need to perform numerous radiological measurements both inside and outside the facility. Technicians need to understand the purpose, process and specific methodology to sampling various materials for radiological contaminants, as well as environmental sampling for potential off-site releases. Students demonstrate the sampling methodologies for various liquids, solids and gasses both inside and outside the plant, as well as describe the various barriers that are used to mitigate effluent releases. Through group discussion and teamwork, students apply a systematic approach to extracting samples from various materials and the environment with the intent of anticipating and solving effluent problems.

Prerequisite(s): SAF7613 and SAF7616
Corerequisite(s): none

SAF7633 Radiological Incident Assessment

In accordance with provincial and federal requirements, plans must be put in place in the case of a radiological incident or accident. Radiation Protection Technicians must understand how radiological incidents are assessed as they play a key role in the cleanup of radiological incidents. Students summarize the appropriate response to radiological incidents, what their role and responsibilities are in the event of an incident, how the scope of their role changes in response to an emergent event and how to assess radiological incidents. Through group and individual efforts students analyze and apply relevant information to systematically approach radiological incidents with the goal of minimizing dose to themselves, other workers and the public.

Prerequisite(s): SAF7604
Corerequisite(s): none

SAF7640 Reactor Chemistry

Radiation Protection Technicians are responsible for radiological hazard assessments associated with reactor maintenance activities. Radiation Protection Technicians need to understand how radioactivity is controlled and contained within CANDU systems. Students identify CANDU systems that are important to plant safety and radiological containment. They also summarize basic water chemistry control fundamentals. Through the application of mathematics and information from a variety of sources, students work individually and in groups to effectively communicate and document information regarding CANDU safety systems and chemistry control fundamentals for radiological related operations.

Prerequisite(s): PHY7016 and SAF7615
Corerequisite(s): none
SAF7642 Radiological Waste: Disposal, Storage and Decommissioning

Radiation Protection Technicians are involved in the uranium fuel cycle as well as the generation of various forms of radiological waste. Radiation Protection Technicians need to be aware of the risks when handling waste as it is a growing aspect of the Canadian nuclear industry. Students investigate the uranium fuel cycle from the point of mining uranium ore to the long-term disposal strategies for burned uranium fuel. Students examine characterization of various forms of radiological waste, where it is generated and how it is treated and stored. Students analyze and evaluate relevant information and use a systematic approach to the categorization of radiological waste. Students need to clearly communicate information regarding the storage and disposal of radiological waste and the various waste forms that are generated from nuclear facilities.

Prerequisite(s): MAT7711 and SAF7602 and SAF7604
Corerequisite(s): none

SAF7643 Nuclear Systems and Components

The understanding of various nuclear system components is critical for the assessment of radiological and industrial hazards in a nuclear facility. Nuclear systems are comprised of components, each of which can have industrial and radiological hazards. Students summarize the hazards associated with typical components and how to mitigate these hazards. Students also explain how these components function and their application within a system. Students analyze component and system diagrams in order to understand how the various components work together to perform a specified function. Students then summarize how each system functions in order to ensure that the reactor is running safely.

Prerequisite(s): SAF7617 and SAF7618
Corerequisite(s): none

SAF7644 Radiological Assessment and Scenarios

Radiation Protection Technicians must efficiently and accurately assess radiological hazards to protect the health and safety of themselves, other nuclear workers and the public. Students develop and participate in mock scenarios to further develop their practical skills with regards to identifying radiological hazards, as well as executing mitigation strategies and full plans for these hazards. Students develop and participate in project-based practical scenarios, which refine their systematic approach to radiological assessment and work planning and enhance their use of time and communication.

Prerequisite(s): SAF7613 and SAF7617
Corerequisite(s): none

SAF7645 Industry Safety Certificates

Nuclear workers require a firm understanding of industrial safety fundamentals to ensure their own safety as well as the safety of others. Students have the opportunity to gain a minimum of 10 certifications in various preferred specialties. Possible certifications include Transportation of Dangerous Goods, Confined Space Training, Working at Heights Training, and Lock out Tag Out Training. Through computer-based and face-to-face training, students obtain certifications which will enhance their understanding of safety in an industrial environment.

Prerequisite(s): none
Corerequisite(s): none

SCI7615 Sciences for Understanding Radiation Theory

Scientific concepts form the foundation on which nuclear and radiation principles are developed and applied. Students are introduced to the historical development of our understanding of ionizing radiation. Students learn the theory behind the chemistry, physics and nuclear reactions leading to the understanding of radiation and nuclear reactor operations.

Prerequisite(s): none
Applied Nuclear Science and Radiation Safety (Co-op and Non Co-op Version)

Corequisite(s): none

**SCI7617 Science for the Nuclear Industry**

Radiation Protection Technicians must categorize the fundamentals of science attributed to the operations systems within a nuclear facility. Students apply the principles behind fluid dynamics, material science and the corrosion characteristics of materials used in a nuclear facility. Through analysis of information from a variety of sources, students use problem solving skills and mathematical models to anticipate and solve problems related to nuclear plant operations science fundamentals.

Prerequisite(s): PHY7016 and SCI7615
Corequisite(s): none

**WKT7108 Preparation for Work**

Graduates entering the field of Radiation Protection and Nuclear Operations encounter behavioural based interviews as well as aptitude testing which may have not been encountered with previous employers. Students write resumes and cover letters in a professional manner, perform systematic job searches, watch and practice behavioural-based interviews, and are exposed to the aptitude testing process. Through behavioural-based interviews, aptitude testing and reflection, students engage in professional communication, both individually and as part of a group.

Prerequisite(s): none
Corequisite(s): none

**WKT7116 Co-op Education Work Experience**

For students who qualify academically, there is an opportunity to enhance their diploma with an officially recognized co-op designation. This designation is achieved by successfully completing a paid co-op educational employment experience. This experience gives students the opportunity to gain valuable work experience, network, make contacts in the industry and assess their skills and weaknesses in a real work environment. Students must have completed all course requirements before entering this course.

Prerequisite(s): none
Corequisite(s): none