CNS: Why it matters to you

Eleodor Nichita
CNS President, 2009-2010
Faculty of Energy Systems & Nuclear Science
University of Ontario Institute of Technology

2010-04-19
CNS Chalk River Branch
History

- 1979 – “The Technical Society of the Canadian Nuclear Association”
- 1998 – Incorporation as a separate, not-for-profit organization
  - Canadian Nuclear Society/Société Nucléaire Canadienne, Inc
CNS Objectives

- Act as a forum for the exchange of information relating to nuclear science and technology
- Foster the development and beneficial utilization of nuclear science and technology for peaceful uses
- Encourage education in, and knowledge about, nuclear science and technology
- Enhance the professional and technical capabilities of those involved in nuclear science and technology in the Canadian context
CNS Structure

- CNS Council
  - Technical Divisions
    - Carry out CNS activities on a discipline basis
  - Branches
    - Carry out CNS activities on a geographical basis
  - Committees
    - Manage administrative aspects in support of CNS objectives and activities
Technical Divisions

- Nuclear Science and Engineering Division
- Fuel Technologies Division
- Design & Materials Division
- Nuclear Operations and Maintenance Division
- Environment and Waste Management Division
Branches

- Alberta
- Bruce
- Chalk River
- Darlington
- Golden Horseshoe
- Manitoba
- New Brunswick
- Ottawa
- Pickering
- Québec
- Saskatchewan
- Sheridan Park
- Toronto
- University of Ontario Institute of Technology
CNS Branches

Alberta
Bruce
Chalk River
Darlington
Golden Horseshoe
Manitoba
New Brunswick
Ottawa
Pickering
Québec
Saskatchewan
Sheridan Park
Toronto
University of Ontario Institute of Technology
Committees

- Finance
- Program
- Branch Affairs
- Membership
- Internet
- Education & Communication
- Bulletin

- Honours and Awards
- International Liaison
- Intersociety relations
- Annual Conference
- Fusion
- Young Generation in Nuclear
CNS Activities

- Courses
  - CANDU Reactor Safety
  - CANDU Fuel Technology
  - Regional Overpower Protection
  - Eddy Currents for Engineers
  - Chemistry of Preservation, Degradation and Activity Transport
  - Science Teachers’ Course

- Conferences and Symposia
  - Annual Conference
  - Simulation Symposium
  - International Conference on Simulation Methods in Nuclear Engineering
  - International Conference on CANDU Fuel
  - Steam Generator Conference
  - CANDU Maintenance Conference
  - Nuclear Plant Chemistry
CNS Collaborations

- Functions in close association with the CNA
- Member of the Engineering Institute of Canada (EIC)
  - CNS courses earn EIC Continuing Education Credits
- Agreements with ~20 nuclear societies worldwide (e.g., ANS, ENS, BNES, ChNS, KNS, ANA, PBNC, INSC)
Membership by Branch (2009)

total: 1278
Membership Benefits

- Belong to a Professional Society with its mandate in the area of your professional career
- Take advantage of many excellent opportunities to grow professionally by meeting and networking with colleagues in Canada and internationally
- Take advantage of excellent opportunities to grow personally by volunteering, learning new things and new skills
- Receive quarterly CNS Bulletin
- Receive earliest notification of CNS Courses and Conferences, Branch Seminars and other Programs
- Receive early notices by e-mail of many other items of interest
- Receive CNS Membership Certificate, yearly sticker and membership card
- Receive special member registration fees to CNS Conferences and Courses
- At Conferences organized by another Society (e.g., ANS) and co-sponsored by the CNS, take advantage of same fee as member of the organizing Society
- Free posting of resume on CNS website
- Low membership fees compared to many other similar societies
CNS Bulletin

- Quarterly publication
- Editor: Ric Fluke
- Publisher: Fred Boyd
- Keeps members informed of developments in the industry.
- Occasionally includes technical papers of importance.
CNS Website (www.cns-snc.ca)
Database with CNS-Published Papers
Why CNS Matters

- It is the technical society for nuclear professionals in Canada.
- Has extensive public education activities and an educated public recognizes the benefits of nuclear technology.
- Occasionally produces documents on issues of public interest that involve nuclear technology, e.g.
  - MAINTAINING EXCELLENCE: PLANNING A NEW MULTI-PURPOSE RESEARCH REACTOR FOR CANADA
- Organizes professional development courses with nuclear science and technology focus.
- Organizes technical conferences, symposia and workshops with nuclear science and technology focus.
CNS: a Volunteer Organization

- CNS activities happen because of dedicated volunteers.
- Ask not what your Society can do for you, ask what you can do for your Society.
- To join the CNS is human, to volunteer is divine.
- Volunteer opportunities:
  - Branch activities
  - Division activities (event organization)
  - Committee activities
  - CNS Council
Excellence Recognition
CNS Awards

- W.B. Lewis Medal (technical competence and accomplishment)
- Ian McRae Award (contributions other than scientific)
- Outstanding Contribution Award
- Fellow of The Canadian Nuclear Society (outstanding technical capability and service to the Society)
- Innovative Achievement Award
- John S. Hewitt Team Achievement Award
- Education/Communication Award
- R.E. Jervis Award (student)
- Nominate your colleagues!
Upcoming CNS Events (2010)

- 2\textsuperscript{nd} Canada-China Joint Workshop on Supercritical Water-Cooled Reactors (CCSC-2010); 2010, Apr 25 - Apr 28, Toronto, ON
- 31\textsuperscript{st} Annual Conference of the Canadian Nuclear Society and 34th CNS/CNA Student Conference; 2010, May 24 - May 27, Montréal, Qc
- CNS Conference on Nuclear Education and Outreach (NEO-2010); 2010, Jun 20 - Jun 22, Calgary, AB
- Nuclear Plant Chemistry Conference; 2010, Oct 3 - Oct 7, Québec, Qc
- 8\textsuperscript{th} Int’l Radiolysis, Electrochemistry & Materials Performance Workshop; 2010, Oct 8 – 10, Québec, Qc
- 11\textsuperscript{th} International Conference on CANDU Fuel; 2010, Oct 17 - Oct 20, Niagara Falls, ON
Contacting the CNS

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- Mailing Address:
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  Toronto, ON
  M5G 1V2
- e-mail: cns-snc@on.aibn.com
Nuclear Education and Research at the University of Ontario Institute of Technology
Degree and Diploma Programmes in Nuclear Science and Engineering
Bachelor of Engineering in Nuclear Engineering

Canada’s only CEAB-accredited undergraduate degree program in Nuclear Engineering

- power plant design
- power plant engineering
- engineering of facilities used in the nuclear fuel cycle
- decommissioning and waste management system design.
<table>
<thead>
<tr>
<th>Year - Semester</th>
<th>Subject</th>
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<th>Subject</th>
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<tbody>
<tr>
<td>1 - 1</td>
<td>Calculus I</td>
<td>Linear Algebra</td>
<td>Physics I</td>
<td>Engineering Graphics and Design</td>
<td>Complementary Studies Elective</td>
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<td>Calculus II</td>
<td>Environmental Science</td>
<td>Physics II</td>
<td>Chemistry for Engineers</td>
<td>Introduction to Programming</td>
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<td>Radiological and Health Physics</td>
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<td>2 - 1</td>
<td>Differential Equations for Engineers</td>
<td>Fluid Mechanics</td>
<td>Problem Solving, Modelling &amp; Simulation</td>
<td>Structure and Properties of Materials</td>
<td>Introduction to Nuclear Physics</td>
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<td>Electric Circuits</td>
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<td>Advanced Engineering Mathematics</td>
<td>Thermodynamic Cycles</td>
<td>Statistics and Probability for Engineers</td>
<td>Radiation Protection</td>
<td>Nuclear Reactor Kinetics</td>
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<td>OR</td>
<td>Numerical Methods</td>
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<td>Impact of Science and Technology on Society</td>
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<td>Complementary Studies Elective</td>
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<td>Strength of Materials</td>
<td>Reactor Control</td>
<td>Nuclear Reactor Design</td>
<td>Corrosion for Engineers</td>
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<td>Engineering Economics</td>
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<td>4 - 1</td>
<td>Risk Analysis Methods</td>
<td>Engineering Science Elective</td>
<td>Nuclear Plant Design and Simulation</td>
<td>Thesis Design Project I</td>
<td>Radioactive Waste Management Design</td>
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<td>Strategic Management for Professionals</td>
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<td>Ethics, Law and Professionalism for Engineers</td>
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Bachelor of Applied Science in Nuclear Power

Four year honours degree program that prepares graduates for a wide range of technical work in the nuclear power plant industry:

- control room operators
- shift operating supervisors
- maintenance supervisors
- simulator instructors
- supervisory and management positions that require a strong applied science foundation and knowledge of station operation
# Bachelor of Applied Science in Nuclear Power

<table>
<thead>
<tr>
<th>Year - Semester</th>
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<td>1 - 1</td>
<td>Calculus I</td>
<td>Linear Algebra for Engineers</td>
<td>Physics I</td>
<td>Engineering Graphics</td>
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<td>Calculus II</td>
<td>Environmental Science</td>
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<td>Differential Equations for Engineers</td>
<td>Electric Circuits</td>
<td>Radiation Effects on Material Properties</td>
<td>Introduction to Nuclear Physics</td>
<td>Introduction to Programming</td>
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<td>2 - 2</td>
<td>Thermodynamics and Heat Transfer</td>
<td>Electric Power Systems</td>
<td>Radiation Protection</td>
<td>Nuclear Reactor Kinetics</td>
<td>Collaborative Leadership</td>
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<tr>
<td>3 - 1</td>
<td>Nuclear Plant Electric and Auxiliary Systems</td>
<td>Fluid Mechanics</td>
<td>Radioactive Waste Management</td>
<td>Nuclear Plant Operation</td>
<td>Organizational Behaviour</td>
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<td>3 - 2</td>
<td>Nuclear Steam Supply Systems</td>
<td>Technical Elective I</td>
<td>Mechanical Equipment and Systems</td>
<td>Reactor Control</td>
<td>Complementary Studies I</td>
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<td>4 - 1</td>
<td>Nuclear Plant Steam Utilization Systems</td>
<td>Technical Elective II</td>
<td>Thesis Project I</td>
<td>Complementary Studies II</td>
<td>Complementary Studies III</td>
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<td>4 - 2</td>
<td>Nuclear Plant Safety</td>
<td>Technical Elective III</td>
<td>Thesis Project II</td>
<td>Nuclear Fuel Cycles</td>
<td>Engineering Economics</td>
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</table>
Bachelor of Applied Science in Nuclear Power

Transfer credits are available for up to half the courses (20 out of 40). Summer “bridge” program that covers university mathematics and science fundamentals.

Transfer credits may be given for:
- college diplomas in engineering technology
- courses taken towards other degrees
- industry training courses
Bachelor of Applied Science in Nuclear Power: “Bridge + 2 years”

<table>
<thead>
<tr>
<th>Semester</th>
<th>Subject</th>
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<td>Semester 1 (Bridge)</td>
<td>Math Foundation for Engineers I</td>
<td>Math Foundation for Engineers II</td>
<td>Math Foundation for Engineers III</td>
<td>Physics Foundation for Engineers</td>
<td>Fluid Mechanics &amp; Thermodynamics</td>
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<tr>
<td>Semester 2 (BASc Year 3 - 1)</td>
<td>Mechanical Equipment and Systems</td>
<td>Electric Circuits</td>
<td>Radiation Effects on Material Properties</td>
<td>Radiation and Nuclear Technologies</td>
<td>Introduction to Nuclear Physics</td>
<td>Complementary Studies</td>
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<tr>
<td>Semester 3 (BASc Year 3 - 2)</td>
<td>Chemistry for Engineers</td>
<td>Electric Power Systems</td>
<td>Environmental Science</td>
<td>Radiation Protection</td>
<td>Nuclear Reactor Kinetics</td>
<td>Collaborative Leadership</td>
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<tr>
<td>Semester 4 (BASc Year 4 - 1)</td>
<td>Nuclear Steam Supply Systems</td>
<td>Nuclear Plant Electric and Auxiliary Systems</td>
<td>Thesis Project I</td>
<td>Radioactive Waste Management</td>
<td>Nuclear Plant Operation</td>
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<td>Semester 5 (BASc Year 4 - 2)</td>
<td>Nuclear Plant Steam Utilization Systems</td>
<td>Nuclear Fuel Cycles</td>
<td>Thesis Project II</td>
<td>Reactor Control</td>
<td>Nuclear Plant Safety</td>
<td>Engineering Economics</td>
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</table>
Bachelor of Science in Health Physics and Radiation Science

Four year honours degree program that prepares graduates to work in a range of industries, research laboratories and government agencies:

- radiation safety
- use of isotopes in medical diagnostics and treatments
- food irradiation
- non-destructive testing
<table>
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<tr>
<th>Year-Semester</th>
<th>Subject</th>
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<td>Chemistry I</td>
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<td>Biology for Engineers</td>
<td>Physics II</td>
<td>Chemistry II</td>
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<td>Radiation and Nuclear Technologies</td>
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<td>2-1</td>
<td>Differential Equations for Engineers</td>
<td>Cell and Molecular Biology</td>
<td>Problem Solving</td>
<td>Introduction to Organic Chemistry</td>
<td>Introduction to Nuclear Physics</td>
<td>Collaborative Leadership</td>
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<tr>
<td>2-2</td>
<td>Adv'd Engineering Math or Numerical Methods</td>
<td>Statistics and Probability for Engineers</td>
<td>Environmental Science</td>
<td>Radiological and Health Physics</td>
<td>Health Physics Laboratory</td>
<td>Impact of Science and Technology on Society</td>
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<td>3-1</td>
<td>Radiation Detection and Measurement</td>
<td>Anatomy and Physiology</td>
<td>Electric Circuits</td>
<td>Medical Imaging</td>
<td>Introduction to Nuclear Reactor Technology</td>
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<td>3-2</td>
<td>Radiation Biophysics and Dosimetry</td>
<td>Radioisotopes and Radiation Machines</td>
<td>Science OR Engineering Elective</td>
<td>Engineering Economics</td>
<td>Scientific Instrumentation</td>
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<tr>
<td>4-1</td>
<td>Risk Analysis Methods</td>
<td>Industrial Applications of Radiation Techniques</td>
<td>Environmental Effects of Radiation</td>
<td>Thesis Project I</td>
<td>Liberal Studies Elective</td>
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<tr>
<td>4-2</td>
<td>Senior Science OR Engineering Elective</td>
<td>Therapeutic Applications of Radiation Techniques</td>
<td>Senior Science OR Engineering Elective</td>
<td>Thesis Project II</td>
<td>Liberal Studies Elective</td>
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</tr>
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</table>
Graduate Diplomas in Nuclear Technology

A suite of six programs in nuclear technology, each diploma requiring the completion of four graduate-level courses. Designed for life-long-learning.

- Reactor Systems
- Fuel, Materials & Chemistry
- Operation & Maintenance
- Health Physics
- Radiological Applications
- Safety, Licensing & Regulatory Affairs
Graduate Degrees in Nuclear Engineering

All graduate programs are available for full-time or part-time study. Most graduate courses are offered after 4 pm and are also available via the Internet.

- Master of Engineering – MEng
  - 10 courses, or
  - project + 7 (or 8) courses
- Master of Applied Science - MASc
- Doctor of Philosophy - PhD
Undergraduate Course Delivery

- Courses taken only by undergraduate students (course ID starts with 1, 2 or 3) are usually delivered during the day (from 8 am to 5 pm)
- Courses that are primarily for undergraduate students but can be taken towards graduate degrees and diplomas (course ID starts with 4) are usually delivered after 4 pm, as 3 hour lectures once a week
Graduate Course Delivery

- Courses that are primarily for graduate programs but can be taken by undergraduate students as electives (course ID starts with 5), and those for graduate programs only (course ID starts with 6), are usually delivered after 4 pm, as 3 hour lectures once a week.

- All the 4xyz, 5xyz and 6xyz courses in the nuclear programs are intended to be available via the Internet.
Contacts

- www.uoit.ca
- www.nuclear.uoit.ca
- www.graduatestudies.uoit.ca
- kerry.armstrong@uoit.ca - academic advisor
- igor.pioro@uoit.ca - director of graduate studies
- george.bereznai@uoit.ca - dean
Thank you!