

U N E N E
University Network of
Excellence in Nuclear
Engineering

UNENE – Networking in Nuclear Engineering

Dr. V.G. Snell
Programme Director, UNENE



Nuclear Energy in Canada

- 19 operating nuclear power plants
- 62% of the electricity of province of Ontario
- 16% of Canada's electricity (21 NPPs)
- Refurbishment of 10 CANDU plants starting from 2016
- Retirement of experienced nuclear engineers
- Knowledge preservation of design and licensing basis of current plants





What is UNENE?

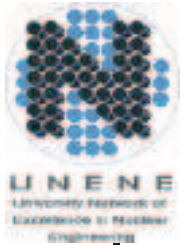
- University Network of Excellence in Nuclear Engineering
- Established 2002
- An industry-university partnership which:
 - Supplies highly-qualified graduates
 - Supports nuclear research
 - Creates respected university-based experts





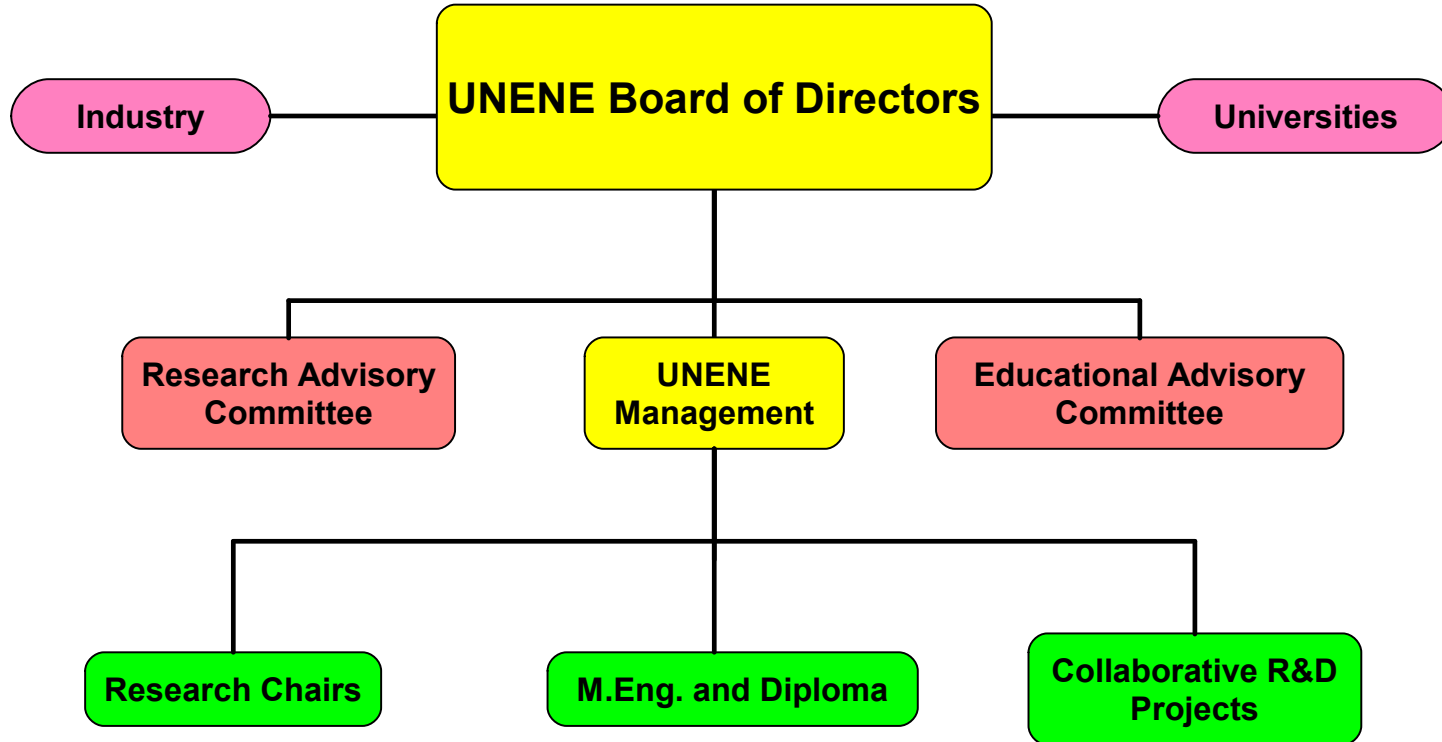
Members

- Canadian Nuclear Laboratories (Chalk River)
- Bruce Power
- Ontario Power Generation
- Canadian Nuclear Safety Commission
- CANDU Owners Group
- AMEC-NSS
- Nuclear Waste Management Organization
- SNC-Lavalin-Nuclear
- McMaster University
- Queen's University
- University of Ontario Institute of Technology
- University of Saskatchewan
- University of Toronto
- University of Waterloo
- Western University
- Ecole Polytechnique
- University of New Brunswick
- Royal Military College
- University of Guelph
- University of Windsor



Organization

UNENE Organization





Research Chairs

- Anchors for establishing strong research teams in key nuclear technology areas
- ~\$200,000 / year – UNENE/Canada cost share
- Current chairs:
 - McMaster – Safety / Thermohydraulics
 - Queen's – Nuclear Materials
 - Toronto – Corrosion of Alloys
 - Waterloo – Risk & Reliability
 - Western – I&C, Electrical
 - UOIT – Health Physics



Collaborative Research and Development Grants

- Small focussed projects
 - ~\$36,000 / year for 3 years
- Examples:
 - Waterloo – seismic risk analysis
 - McMaster – sub-channel mixing
 - Guelph – D₂O chemistry
 - Western – stress-corrosion cracking in Alloy 800
 - UOIT – non-destructive testing sensors (feeders)
 - Ottawa – thermohydraulics
 - Queen's – channel spacers - radiation ageing



Reactor Materials Testing Facility (Tandem Accelerator) – Queen's



05/06/2015

UNENE – Networking in Nuclear
Engineering.ppt

8



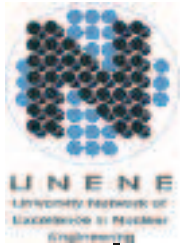
New Hot Cells (McMaster)



05/06/2015

Engineering.ppt

9



Staff Enhancement Options

1. UNENE Master's of Engineering
2. UNENE diploma
3. Advanced Professional Development



1. The UNENE M.Eng.

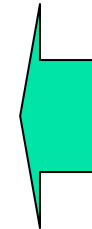


- Course based:
 - 10 courses OR
 - 8 courses plus a project
- Accredited by Ontario Council of Graduate Studies
 - Courses are graduate level in content & expectations
- Offered by McMaster, Waterloo, UOIT, Western and Queen's
- Geared to the working professional
 - Topics are relevant to work
 - Scheduling recognizes students have a day job
 - Typically students finish in 2 – 4 years while working full-time



Courses

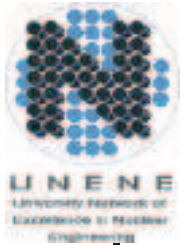
- UN0802: Nuclear Reactor Physics [McMaster]
- UN0803: Nuclear Reactor Safety Design [McMaster]
- UN0804: Nuclear Reactor Heat Transport System Design [McMaster]
- UN0502: Nuclear Plant Systems and Operations [UOIT]
- UN0501: Nuclear Fuel Management of the Reactor Core [UOIT]
- UN0601: Control, Instrumentation and Electrical Systems in CANDU based Power Plants [Western]
- UN0602: Nuclear Fuel Waste Management [Western]
- UN0603: Project Management for Nuclear Engineering [Western]
- UN0701: Engineering Risk and Reliability [Waterloo]
- UN0805: Introduction to Operational Health Physics [McMaster]
- UN0806: Nuclear Fuel Engineering [McMaster]
- UN0807: Power Plant Thermodynamics [McMaster]
- UN0808: Reactor Chemistry and Corrosion [McMaster]
- UN0901: Nuclear Materials [Queen's]



Four core courses

Coming soon:

UN0503 - Nuclear Energy in Society: Regulation and Our Energy Future



Aspects of Learning

- Lecture time ~ 40 hours per course
 - Done on 4 alternate weekends in Whitby
 - Distance Learning for remote students
 - In real time; also recorded for later review
- **Free!** discipline refreshers before key topics





Participants

Participants										
Robin Chaplin (M...	1									
Dan										
Ernest										
Hussain Al-Bassam										
Ishan Roy										

Chat

Show All

Hussain Al-Bassam: thank you

Left on February 26, 2011 at 10:39 AM

Joined on February 26, 2011 at 10:57 AM

Send to This Room

Audio - Robin Chaplin



Whiteboard - Main Room

Application Sharing

UNENE Thermo Primer Section 3.pdf - Adobe Reader

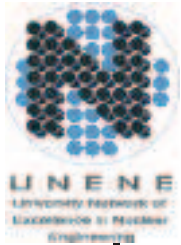
File Edit View Document Tools Window Help

6 / 23 35.9%

Click to go to the next page in the document

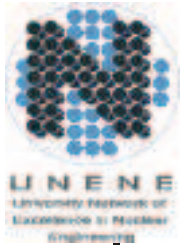
HEAT CYCLE

Heat is the result of temperature differences and has the same units as work. It is convenient to measure work output (J/kg) as an area on a plot with temperature on one axis. Thus we get units of J/kg^oK on the other axis. This is entropy s.



2. The UNENE Diploma

- Four courses instead of ten
- Identical to the M.Eng. courses
 - Same: content, classroom, standards, weekend delivery
- Two must be core courses
- Offered by McMaster and UOIT
- Can finish the diploma in 1 to 2 years while working full-time



Transfers

Students can transfer credits from the diploma to the M.Eng. (and vice versa) as long as they have not accepted the diploma or degree



3. Advanced Professional Development

- UNENE offers in-house professional development courses
- Choice of any of the topics given in the University programmes
- Customized to meet Systematic Approach to Training



What Networking Means...

- Each UNENE Course is “owned” by one UNENE University – supplies instructor
 - Students exposed to a wide range of superb instructors – often UNENE Chairs
- Students can enrol in any UNENE University (classes are identical)
- All UNENE Universities recognize & credit all UNENE courses
- Industry funding for research matched by government of Canada



For More Information

- UNENE web site: <https://unene.ca/>
- Questions?
 - Victor Snell - vgssolutions@rogers.com