




SCHULICH SCHOOL OF MEDICINE & DENTISTRY

Educational Pathways and Training Programs : A Canadian Example


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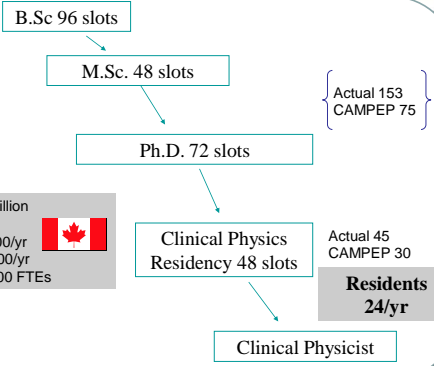
Board Exams Pressure


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- **American Board of Radiology (ABR)**
 - Beginning in 2012, Candidates taking the ABR Part 1 Exam in Radiological Physics must have graduated from a CAMPEP-accredited PhD program or Residency.
 - Beginning in 2014, Candidates taking the ABR Part 1 in Radiological Physics must complete a CAMPEP-accredited Residency.
- **Canadian College of Physicians in Medicine (CCPM)**
 - **Radiation Oncology Physics: As of Jan 2016: all applicants writing the Membership Exam must have graduated from a Graduate Program or Residency that is accredited by CAMPEP.**
 - **Nuclear Medicine, Diagnostic Radiology, Magnetic Resonance**
 - no specific directives at this time.

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Radiation Oncology Demand (2010)



Population : 34 Million 


Incidence: 178,000/yr
RT cases: 75,000/yr
Physicists: 300 FTEs

Actual 153
CAMPEP 75

Actual 45
CAMPEP 30

Residents
24/yr

Clinical Physicist

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CAMPEP Programs

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GRADUATE PROGRAMS

- Carleton University (PhD)
- McGill University
- University of Alberta – Cross Cancer Institute
- University of British Columbia
- University of Calgary – Tom Baker Cancer Cent
- University of Victoria – BC Cancer Agency
- University of Western Ontario (2010)

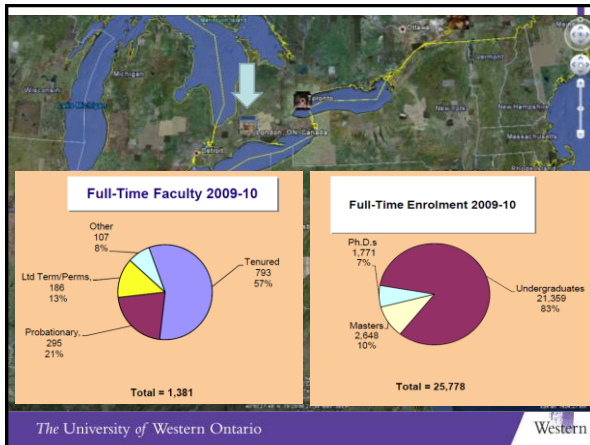
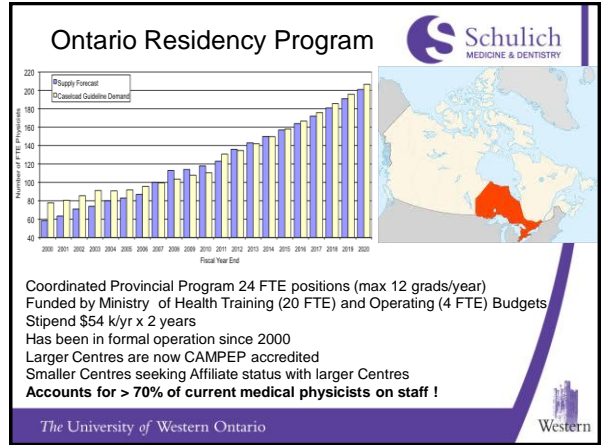
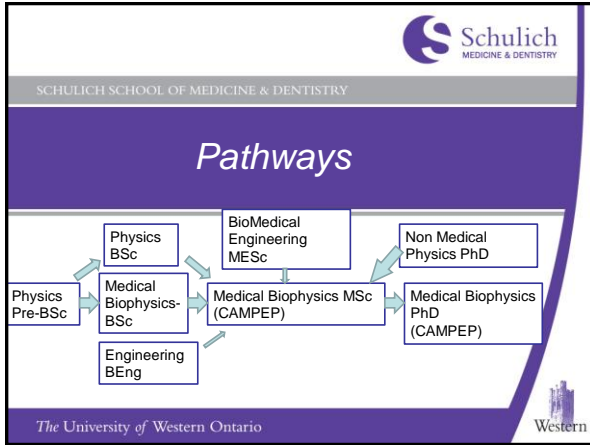
RESIDENCIES – RADIATION ONCOLOGY

- Cancer Care Manitoba
- University of Alberta – Cross Cancer Institute
- London Regional Cancer Program (2006)
- McGill University
- The Ottawa Hospital Cancer Centre
- Tom Baker Cancer Centre
- University of Toronto

RESIDENCIES – IMAGING

- University of Alberta – Cross Cancer Institute

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Medical Biophysics

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- First Biophysics Department in Canada
 - Founded by Dr. A.C. Burton
 - M.Sc./Ph.D. Degrees (1947)
 - B.Sc. / B.MSc. (1966)
 - CAMPEP Approval (2010)
- Composition
 - 10 core members
 - > 70 Appointees
 - 22 Undergrads (Y4)
 - 90+ Grad Students
- City-wide partnerships with hospitals and research institutes


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New CAMPEP MSc-PhD




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- Admission Requirements
 - More strict than pure Research Option
 - “Minor in Physics” (minimum)
- Research PhD (Non-CAMPEP)
 - Scientific Communications: 0.5 credit (mandatory)
 - Students typically take 1-4 additional half-courses (optional)
 - Expect 4 Peer-Reviewed Publications, >4 presentations
- Research PhD (CAMPEP) – same but more courses
 - 6.0 full course credits required by CAMPEP (MSc); mandatory
 - Clinically-oriented training and exam material
 - CCPM-certified Physicists have a clear role

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
COURSE WEIGHT	COURSE NAME (Number) * indicates course in preparation	FACULTY
ALL SUBSPECIALTIES – COMPULSORY CORE (weight of 4.0)		
N/A	Radiation and Lab Safety Orientation	University, Hospitals, Institutes
0.5	Radiological Physics and Dosimetry (P9655A)	Eugene Wong FCCPM
0.5	Radiation Biology (9567B)	Jerry Battista FCCPM
0.5	Basic Anatomy (e.g. ACB 3319)	External
0.5	Basic Physiology (e.g. Phys 2130)	External
0.5	Inferencing from Data Analysis (9522)	Yves Bureau
0.5	Research Ethics & Biostatistics (Web course)	External (J Williams)
0.5	Medical Imaging Biophysics (9515A)	Maria Drangova
0.5	Scientific Communication (9513Y)	Terry Thompson
IMAGING SCIENCES – COMPULSORY ELECTIVES (weight of 2.0)		
0.5	Introductory Medical Imaging (9503)	Jim Laceyfield, David Holdsworth, Paula Foster, Greg Marsh
0.5	Practical Medical Physics Lab (9520Y)	David Holdsworth
0.5	Imaging Principles (9516Y)	Ian Cunningham FCCPM & T
0.5	MRI Physics 9663	Robert Bartha
0.5	Conceptual MRI 9650	Charles McKenzie
0.5	Nuclear Magnetic Resonance 9662	Blaine Chronik
0.5	Advanced MRI Physics 9665*	Jean Theberge MCCPM
1.0	Practical Nuclear Medicine Physics (9570/80*)	Robert Stodilka MCCPM
RADIATION THERAPY – COMPULSORY ELECTIVES (weight of 2.0)		
1.0	Practical Radiotherapy Physics (9570/80*)	LRPC clinical physicists F/MCCPM
1.0	To be chosen from Imaging Sciences Electives (above)	

Sample Curriculum – Radiotherapy MSc-PhD (CAMPEP)




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Year 1	<ul style="list-style-type: none"> •Radiation and Lab Safety Orientation •Radiological Physics and Dosimetry (P9655A) •Radiobiology (9567B) •Basic Anatomy (e.g. ACB 3319) •Basic Physiology (e.g. PHYSIOLOGY 2130) •Inferencing from Data Analysis (9522) •Research Ethics & Biostatistics (Web course) •Medical Imaging Biophysics (9515A) •Scientific Communication (9513Y)
Year 2	<ul style="list-style-type: none"> •Practical Radiotherapy Physics (9570/80) •Electives (1.0 credit) from other subspecialties •Thesis Advisory Committee Meeting #1 (thesis proposal) •Low-Level Comprehensive Examination
Year 3, 4	<ul style="list-style-type: none"> •Thesis Advisory Committee Meeting #2 •Additional Clinical Exposure: the student will shadow a medical physicist or Year-2 resident for special topics such as acceptance testing, QC, site planning, treatment planning. Duration: 2 hours/session x 5 sessions. •Mid-Level Comprehensive Examination
Year 5	<ul style="list-style-type: none"> •Thesis Advisory Committee Meeting #3 •Thesis Defense •Clinical Comprehensive Exam (a mock CCPM-like/Ontario A-Review <u>oral</u> exam) •Well prepared for a Residency Program (possibly abbreviated by 6 months)

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CAMPEP Non-Thesis MSc?

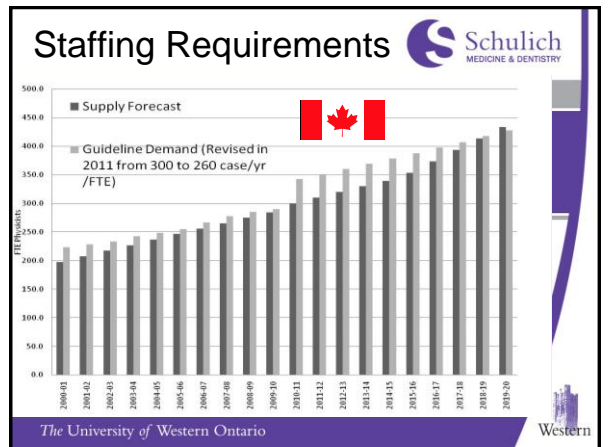
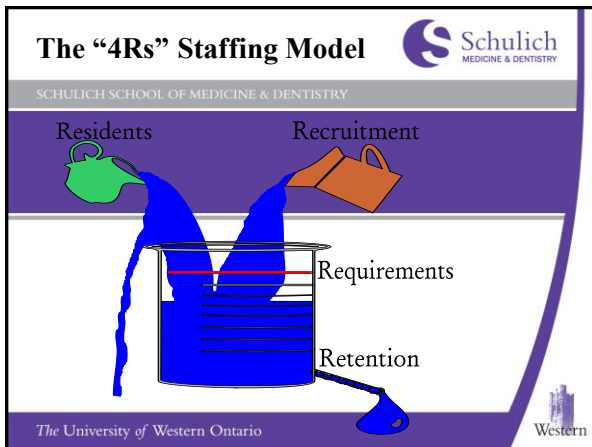
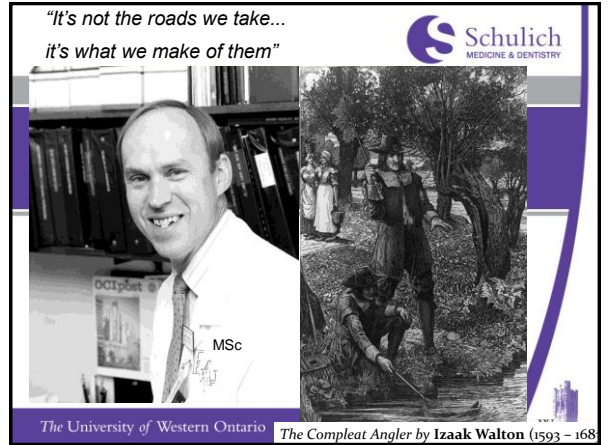
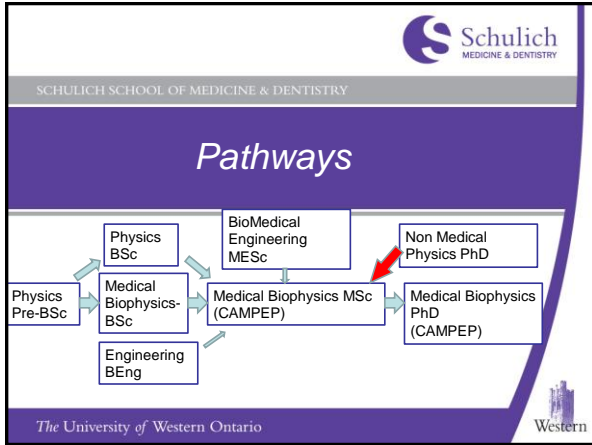


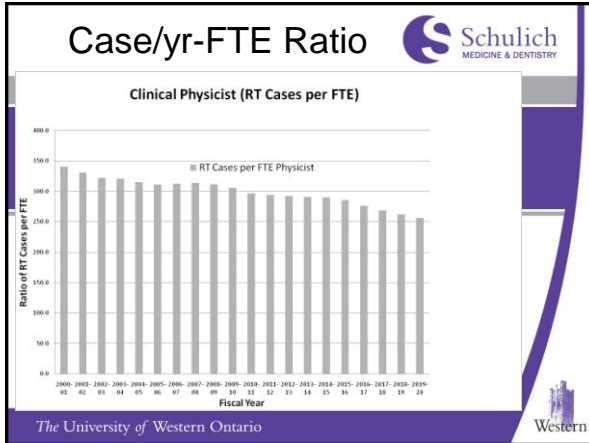
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- CAMPEP courses (only) MSc degree
- Access To/From Research PhD degree

- Re-Opens door to Board Exams
- Could generate University revenue!
- Require more CCPM Faculty if it becomes popular with ‘external’ PhD’s (latecomers)

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Resident/Staff Ratio ?

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GOAL: To provide new growth in Staffing by supplementing External Recruitment and offsetting Attrition through an idealized Residency Program

$$\text{Residents \% /yr} = [\text{Demand} + |\text{Recruitment} + \text{Loss}|] / \text{Residency Capture Efficiency}$$

$$= [3\%/yr + |4\%/yr - 7\%/yr|] / 0.80$$

$$= 8\%/yr \text{ implies } 16\% \text{ Residency FTEs (in 2 yr program)}$$

Canada: 48 Residents/300 FTE Staff = 16 %

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Conclusion

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The Canadian Training Model continues to be built upon strong graduate programs in Medical Physics/Biophysics feeding Residency Programs

PhD Advantage:

- Courses completed prior to residency
- University academic positions
- Obtain grants for Translational Research in Radiation Oncology
- "Respect" from clinical colleagues and regulatory bodies
- Career Advancement and Flexibility

Is there a specific role for CAMPEP MSc non-thesis degree to "top up" PhDs from non-CAMPEP graduate programs ?

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