

University of Toronto, Department of Radiation Oncology/
The Michener Institute for Applied Health Sciences

Medical Radiation Sciences Program

Report Prepared for

Faculty of Medicine, Education Committee

MAY 2005



Table of Contents

Background of the MRS Program	
Introduction, Mission and Program Goals	i
1. Admission Requirements	1
1.1. Applicant Statistics	
1.2. Projected Student Numbers	
1.3. Current Student Numbers	
1.4. Eligible to Graduate	
2. Awards	3
2.1. MRS Program and Discipline Specific	
2.2. General Scholarships, Bursaries and Awards	
3. Financial Aid	6
4. Curriculum	7
4.1. Nuclear Medicine	
4.2. Radiological Technology	
4.3. Radiation Therapy	
5. Evaluation	10
5.1. Quality of Program	
5.1.1. Student Satisfaction with the Overall Program	
5.1.2. Graduate Satisfaction with the Overall Program	
5.1.3. Course Evaluations	
5.1.4. Accreditation	
5.2. Quality of Graduates	
5.2.1. Employer Satisfaction	
5.2.2. National Certification Results	
5.2.3. Scholarly Activities	
5.2.4. External Awards	
5.2.4.1. T.B.Hurst Award (OAMRT)	
5.2.4.2. Skills for Change: New Pioneers Award	
5.2.4.3. Awards for Final Year Research Project	
5.3. Quality of Faculty	
5.3.1. Preclinical	
5.3.2. Clinical	
Appendix A: Scholarly Activity of Graduates of the Medical Radiation Sciences Program	13

Medical Radiation Sciences Program

Introduction

The Medical Radiation Sciences Program is a three-year second-entry professional degree/diploma program jointly developed and administered by The Michener Institute for Applied Health Sciences and the Department of Radiation Oncology, Faculty of Medicine, University of Toronto. Academic Year 2004-2005 was the sixth year of operation, with the fourth cohort of students graduating.

Mission

To provide an educational experience that produces graduates who:

- deliver an exemplary medical radiation technology service to patients and society,
- effectively adapt to new technology and knowledge and to a changing health care delivery environment,
- advance the discipline and profession through the creation and application of knowledge.

Program Goals

The degree/diploma program aims to produce graduates who:

- have the knowledge and skills required for the award of a B.Sc. in Medical Radiation Sciences from the University of Toronto;
- have the knowledge and skills required for the award of a diploma of Health Sciences from The Michener Institute;
- possess the range and level of knowledge, skills and expertise required for certification by the Canadian Association of Medical Radiation Technologists (CAMRT) and subsequent inclusion in the College of Medical Radiation Technologists of Ontario (CMRTO), the provincial licensing body;
- can apply their knowledge, skills and judgment to a variety of health care settings and can adapt to a changing health care environment;
- have the ability to use their professional knowledge, skills and judgment in the solution of problems and can, through the use of applied research, identify needs and give the appropriate form of professional interaction and care;
- can operate effectively within a multi-disciplinary or multi-professional team;
- are able to identify and develop a philosophy of health education and promotion that reflects the diversity of attitudes, values and beliefs of our multi-cultural society. Students will have the skills and ability to assess and recognize the differing needs of patients and will be able to respond to these individualized needs.
- have experienced, in a structured manner, a variety of professional practices and are able to apply and critically evaluate theory in a range of discipline-specific professional settings.

1. Admission Requirements

The Medical Radiation Sciences (MRS) Program is a second entry program. If the applicant has a Master's or PhD the undergraduate courses are still reviewed, as the prerequisites ensure that each student has the background necessary to be successful in the Program.

1. A minimum of one year (5 credits) of university education, with one full course in each of:
 - o Biology
 - o Mathematics
 - o Physics
2. A minimum cumulative Grade Point Average (GPA) of B-, and a minimum grade of C- in each of the required courses

Because all lectures, seminars and clinical laboratory sessions and activities are conducted in English, it is essential that students have an adequate knowledge of written and spoken English. *The minimum requirement for the TOEFL Computer-based Test is total score of 250 (written test 600) with at least 5.0 on Essay Rating.*

1.1 Applicant Statistics

2003/2004 Academic Year

Applicant Numbers	Radiological Technology	Nuclear Medicine	Radiation Therapy	TOTAL
Total Number of Applicants	133	133	191	457
From UofT	40	43	59	142
From Other Universities	93	90	132	315
Successful Candidates	26	37	69	132

2004/2005 Academic Year

Applicant Numbers	Radiological Technology	Nuclear Medicine	Radiation Therapy	TOTAL
Total Number of Applicants	117	116	176	409
From UofT	28	31	43	102
From Other Universities	89	85	133	307
Successful Candidates	27	37	68	132

1.2 Projected Student Numbers

Enrollment	Radiological Technology	Nuclear Medicine	Radiation Therapy	TOTAL
Class 2007	35	40	55	130
Class 2006	30	35	65	130
Class 2005	25	30	75	130

1.3 Current Student Numbers

Enrollment	Radiological Technology	Nuclear Medicine	Radiation Therapy	TOTAL
Class 2007	27	36	65	128
Class 2006	23	35	65	123
Class 2005	31	28	66	125

(As of 02/03/05)

1.4 Eligible to Graduate

Eligible to Graduate	Radiological Technology	Nuclear Medicine	Radiation Therapy	TOTAL
June 8, 2005	29	28	63	120

2. Awards

Students registered in the Medical Radiation Sciences Program are eligible to apply for several awards, bursaries and scholarships administered by both the University of Toronto and The Michener Institute (TMI).

2.1 MRS Program and Discipline Specific – each year the awards listed below are conferred

Discipline	Award	Granting Institution	Year	Number Available	Amount
MRS	Overall Highest Academic Standing: <i>Gold, Silver and Bronze awards are given to the graduates attaining the highest overall cGPA</i>	UT	3	3	\$100
	MRS Research Award: <i>Awarded to the student with the highest mark in the Research Methods II course (RSC510Y1)</i>	UT	3	1	\$200
	Board of Governors' Medal Awards: <i>Gold and Silver awards are given to the graduates with the highest overall cGPA in each discipline</i>	TMI	3	2 x 3	No monetary award - medal
Nuclear Medicine	Alexandra Mitchell Prudencio Memorial Scholarship: <i>Demonstrated excellent patient care, has taken an active role in class +/-or Michener activities, maintained an overall B average with no supplemental</i>	TMI	3	1	\$500
	Dr. J.E. Prince Nuclear Medicine Scholarship: <i>Good academic standing throughout the program, demonstrated an interest in the community, (Preferably Essex and Kent County, but all students are eligible.) demonstrated an interest in health care.</i>	TMI	2 or 3	1	\$500
	MDS Nordion Bursary: <i>Demonstrated solid academic technical performance, excellent interpersonal and teamwork skills, and high personal and professional standards</i>	TMI	varies	1	\$1000

2.1 MRS Program and Discipline Specific continued

Discipline	Award	Granting Institution	Year	Number Available	Amount
Rad. Tech.	Dr. Jim Sieniewicz Radiological Technology Scholarship: <i>Successfully completed third year, in good academic standing and made significant contribution to the Program</i>	TMI	Grads	1	\$500
	Tyco Healthcare Scholarship: <i>Successfully completed program in Radiological Technology, MRI or Respiratory Therapy</i>	TMI	Grads	1	\$500
Rad Therapy	BLJC Radiation Therapy Scholarship: <i>- awarded to a student entering 2nd year, maintained a B+, made a significant contribution to the Program, provided assistance to faculty, provided mentorship and collegiality to peers, also exhibited excellence in academic pursuits with either leadership or community involvement</i>	TMI	2	1	\$500

2.2 General Scholarships, Bursaries and Awards – the awards and scholarships below are open to all students at TMI, including students in the MRS Program

Award	Granting Institution	Year	Number Available	2004 Recipients	Amount
Dr. Diana Michener Schatz Scholarship: <i>Successful completion of a diploma/advanced diploma program, maintained an overall B average, demonstrated leadership while at TMI, involved in a range of Michener and community activities</i>	TMI	Grad Yr	1		\$500
Dr. Renate Krakauer Research Award: <i>Awarded to a student engaged in, or intending to engage in a research project in any health sciences subject area related to Michener programs under the supervision of a TMI faculty member</i>	TMI	2 and up	1		\$1000
Entrance Scholarships: <i>Exhibited excellence in academic pursuits combined with leadership skills and community involvement</i>	TMI	1	Up to 3	Awarded to a Rad. Technology & Radiation Therapy std.	\$1,500
President's Scholarship: <i>Contributed to student life, demonstrated leadership, set an example in lab and classroom as a team player, demonstrated initiative, maintained an overall B average with no supplemental, "no needs improvement" in performance appraisal</i>	TMI	Grad Yr	1	Radiation Therapy 2004 Graduate	\$1,500

3. Financial Aid

Students registered in the Medical Radiation Sciences Program are eligible to receive full OSAP and UTAPS, which is administered through the Office of Admissions and Awards, at the University of Toronto. In addition students who are eligible have access to a number of bursaries, high needs bursaries and other financial grants.

For the academic year 2003/2004:

Financial Aid	Amount
OSAP	1,506,922
UTAPS	138,900
Bursary	49,900
Disability Grant	7,972
High Needs	23,530
Other grants	2,980
TOTAL	\$1,730,204

In addition a bursary administered by The Michener Institute, the **Dr. Fred Heagy Bursary** is available to Nuclear Medicine students. This \$1500 bursary is awarded to a student enrolled in the 2nd/3rd year and who is in financial need or who has medical or special learning needs causing a significant financial burden, which will jeopardize his or her ability to continue in the program.

Two bursaries of \$1500 each were awarded in 2004.

4. Curriculum

Presented below are the curricula for all three disciplines in UT/TMI Medical Radiation Sciences Program for the 2005/2006 academic year.

4.1 Nuclear Medicine

Year 1

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Anatomy Radiopharmacy Clinical Behavioural Sciences I Instrumentation I Radiation Science I	Physiology Radiopharmacy (cont'd) Intro. To Pharmacology Instrumentation II Relational Anatomy	

Year 2

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Nuc Med Application I Nuc Med Health Care Delivery Nuc Med Imaging Theory I Pathobiology Selective I	Nuc Med Applications II Clinical Behavioural Sciences II Nuc Med Imaging Theory II Research Methods I Comparative Imaging Modalities	Health Care Systems Clinical Practicum I

Year 3

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Clinical Practicum II	Clinical Practicum III	Research Methods II (cont'd)
Clinical Project I OR Research Methods II	Clinical Project I OR Research Methods II (cont'd)	Selectives II, III, IV, V & VI

4.2 Radiological Technology

Year 1

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Anatomy Fundamentals of Patient Care Human Osteology Radiographic Methodology I Radiation Science I	Physiology Imaging Modalities I Intro. To Clin. Rad Tech Radiographic Methodology II Relational Anatomy	

Year 2

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Clinical Behavioural Sciences I Imaging Modalities II Systems Methodology Pathobiology Selective I	Clinical Behavioural Sciences II Nuc Med Imaging Theory II Research Methods I Comparative Imaging Modalities Instrumentation/Digital Imaging	Health Care Systems Clinical Practicum I

Year 3

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Clinical Practicum II Clinical Project I OR Research Methods II	Clinical Practicum III Clinical Project I OR Research Methods II (cont'd)	Research Methods II (cont'd) Selectives II, III, IV, V & VI

4.3 Radiation Therapy

Year 1

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Anatomy Clinical Behavioural Sciences I Intro to Patient Care in RT Intro to Radiation Physics Radiobiology & Rad Protection	Physiology Comparative Imaging Modalities Intro. To Clinical Oncology Rad Beams & their Applications Relational Anatomy	

Year 2

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Clinical Oncology I Patient Care in RT II Treatment Planning Radiotherapy Methodology Pathobiology Selective I	Clinical Oncology II Clinical Behavioural Sciences II Research Methods I Treatment Planning (cont'd) Radiotherapy Methodology (cont'd)	Health Care Systems Clinical Practicum I

Year 3

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Clinical Practicum II Clinical Project I OR Research Methods II	Clinical Practicum III Clinical Project I OR Research Methods II (cont'd)	Research Methods II (cont'd) Selectives II, III, IV, V & VI

5 Evaluation

5.1 Quality of Program

5.1.1 Student Satisfaction with the Overall Program

Students in the first and second year of the MRS Program are asked to complete a satisfaction survey every February. The following table represents student satisfaction with the Program, of the two years combined.

	Radiological Technology	Nuclear Medicine	Radiation Therapy
2003/2004	94.0%	86.5%	61.5%
2004/2005	84.3%	88.6%	95.4%

5.1.2 Graduate Satisfaction with the Overall Program

Graduates of the MRS Program are contacted between six to twelve months post graduation and are asked to complete a satisfaction survey. The following table represents graduates for the Class 2002 and Class 2003: data for the Class 2004 currently being collected

	Radiological Technology	Nuclear Medicine	Radiation Therapy
2002	92.6%	79.7%	92.6%
2003	97.5%	100%	96.4%

5.1.3 Course Evaluations

Course evaluations are completed every other year. If however, a major change has occurred with the course (i.e. significant modifications to content, methods of assessment, change in instructor, etc) or if the course has received a poor evaluation previously, a course evaluation will be conducted every year until a satisfactory rating is achieved.

5.1.4 Accreditation

Currently, the three disciplines of MRS Program have full accreditation status (6 years) with anniversary dates for Radiological Technology of Fall 2006, Nuclear Medicine of Fall 2007 and Radiation Therapy of Winter 2008. The MRS Program applied to the Canadian Medical Association Conjoint Accreditation to combine the individual discipline specific accreditations into one overall Program accreditation. January 2007 is the anticipated site visit, in time for the expiration of the radiological technology accreditation.

5.2 Quality of Graduates

5.2.1 Employer Satisfaction

Employers of graduates of the MRS Program are contacted between six to twelve months post graduation and are asked to complete a satisfaction survey. The following table represents graduates for the Class 2002 and Class 2003; data for the Class 2004 currently being collected

Graduating Class	Radiological Technology	Nuclear Medicine	Radiation Therapy
2002	100% satisfied	29% v. satisfied 71% satisfied	67% v. satisfied 33% satisfied
2003	100% satisfied	70% v. satisfied 30% satisfied	100% v. satisfied

5.2.2 National Certification Results

	Radiological Technology	Nuclear Medicine	Radiation Therapy
2002	93.3%	86.4%	100%
2003	100%	100%	100%
2004	92%	78%	97%

This data indicates the % of students successful on the first write of the exam

5.2.3 Scholarly Activities

See Appendix A for scholarly activity of graduates of the MRS Program

5.2.4 External Awards

5.2.4.1 T.B. Hurst Award (OAMRT)

Each year, the Ontario Association of Medical Radiation Technologists (a provincial member of the national professional association) awards the **T.B. Hurst Award** to the graduate who achieves the highest score on the Canadian Association of Medical Radiation Technologists certification examination in each of the disciplines. In 2003, UT/TMI Medical Radiation Sciences students, won in all three disciplines and 2004 in the disciplines of radiation therapy and nuclear medicine.

5.2.4.2 Skills for Change: New Pioneers Award

“Skills for Change” is a charitable organization that prepares immigrants and refugees for employment. Each year this organization honours individuals who have made significant contributions to the Canadian community. This year a first year Radiological Technology student was the lucky recipient of the Youth Award.

5.2.4.3 Awards for Final Year Research Project

One radiation therapy student, who graduated in the Class 2004, submitted an abstract of her final research project to two conferences. At both events, the student was awarded for her poster presentation. The student received:

- **Ed Carpen Award:** the Most Outstanding Technical or Scientific Student Exhibit, at the Annual General Conference of the O.A.M.R.T.
- **Best Poster Award:** 14th Annual Ontario Provincial Conference on Palliative and End of Life Care.

5.3 Quality of Faculty

5.3.1 Preclinical

Preclinical faculty are recruited to teach in the MRS Program from a number of departments within the Faculty of Medicine, University of Toronto; Departments of Radiation Oncology, Pharmacology, Laboratory Medicine and Pathobiology. Faculty, including guest speakers are evaluated using the appropriate Department of Radiation Oncology (DRO) evaluation form.

The Michener Institute employs twenty-four full time discipline specific faculty: 9 Radiation Therapy, 9 Nuclear Medicine and 6 Radiological Technology, of which 5 hold advanced degrees at the Masters level, with 6 more currently in progress. The faculty are evaluated by TMI at least once throughout the academic year as per the collective agreement: it is up to the individual faculty member to share the results of the evaluation with the Program Chair. The faculty, also have the opportunity to have a DRO evaluation completed.

Each year at the Department of Radiation Oncology's Annual General Meeting, the faculty member with the highest teaching effectiveness score on the DRO evaluation is recognized with an award. To date this award has been presented to Radiation Therapy faculty.

5.3.2 Clinical Teaching

All Clinical Coordinators responsible for students in the MRS Program have evaluations completed by students at the end of every academic year. Last year the Michener Institute established an award to recognize exceptional Clinical Coordinators, and students nominated 2 Radiation Therapy and 1 Nuclear Medicine Clinical Coordinators.

A pilot project is currently underway in the Radiation Medicine Program at the Princess Margaret Hospital whereby the students complete an online evaluation of the clinical teaching of radiation therapists. The intent is to introduce this to all clinical sites partnered with the MRS Program.

Appendix A

Scholarly Activity of Graduates of the Medical Radiation Sciences Program

Peer Reviewed Papers

Bruce, L. A Retrospective Study to Determine if there is a Gender-related Difference in Weight Loss in Non-Small Cell Lung Cancer Patients Undergoing Radiation Therapy. Canadian Journal of Medical Radiation Technologists. Winter 2004. Vol. 35(4); pgs.13 – 20 (Radiation Therapy – Class 2004)

Da Silva, S. The Role of a Nuclear Medicine Technologist in Patient Education: A Survey Analysis. Canadian Journal of Medical Radiation Technologists. Fall 2004. Vol. 35(3); pgs.11 – 19 (Nuclear Medicine – Class 2004)

Denkers, M., Dugas, G. and Parlan, G. Radiation Therapy Clinical Exchange Experience in Holland. Canadian Journal of Medical Radiation Technologists. Winter 2004. Vol. 35(4); pgs. 29 – 30 (Radiation Therapy – Class 2004)

Huang, G. et al. Error in the delivery of radiation therapy: Results of a Quality Assurance Review. Int J Radiat Oncol Biol Phys. 2005 Apr 1;61(5):1590-5. (Radiation Therapy – Class 2002)

Li, W, and Palmer, C. Investigating the Effectiveness of Reflective Journaling For Radiation Therapy Students: A student perspective. Canadian Journal of Medical Radiation Technologists. Spring 2004. Vol. 35:1; pgs.3 – 9. (Radiation Therapy – Class 2003)

McGuffin, M. and Wright, J. Information-seeking Behaviour of Radiation Therapy Patents. Radiation Therapist. Fall 2004. Vol. 13(2); pgs. 93 – 98 (Radiation Therapy – Class 2002)

Yan, J. The Effect of Technique and Fraction Size on Therapist-Assessed Acute Toxicity in Patients Receiving High Precision Radiation Therapy for Prostate Cancer – A Pilot Study. Canadian Journal of Medical Radiation Technologists. Fall 2004. Vol. 35(3); pgs.21 – 27 (Radiation Therapy – Class 2004)

Published Abstracts

Huang, Shao Hui. IMRT for Prostate Cancer – An Investigation into Dose Escalation and Therapeutic Ratio. Radiotherapy & Oncology. September 2004. Vol(72);S 1 (Radiation Therapy – Class 2004)

McPhee, Nancy. Bony Landmark Defined Radiotherapy Portals for Elective Lymph Node Irradiation Geographically Misses the Planning Target Volume Compared to Vessel Defined Radiotherapy Portals for Prostate Radiotherapy. Radiotherapy & Oncology. September 2004. Vol(72);S 1 (Radiation Therapy – Class 2004)

Sie, Fanny. An Integrated Navigation System for Routine Use in Radiotherapy Positioning. Radiotherapy & Oncology. September 2004. Vol(72);S 1 (Radiation Therapy – Class 2002)

Haycocks, T and **Yan, Jing**. The Effect of Technique and Fraction Size on Therapist-Assessed Acute Toxicity in Patients Receiving High Precision Radiation Therapy for Prostate Cancer – A Pilot Study. Canadian Journal of Medical Radiation Technologists. Canadian Association of Radiation Oncologists, Halifax, September 2004 (Radiation Therapy – Class 2004)

Oral Presentations at Conferences

Greig, Michelle, “Level of Concordance Between Proxy and Cancer Patient's Ratings in Brief Pain Inventory.” 14th Annual Provincial Conference on Palliative and End-of-Life Care, Toronto, Ontario, April 2004. Project Supervisor: Bovett, G. Co-Supervisors: Gillies, C., Hicks, D., Chow, E. (Radiation Therapy – Class 2004)

McPhee, Nancy, “Bony Landmark Defined Radiotherapy Portals for Elective Lymph Node Irradiation Geographically Misses the Planning Target Volume Compared to Vessel Defined Radiotherapy Portals for Prostate Radiotherapy.” Canadian Association of Radiation Oncologists, Halifax, September 2004. Project Supervisor: Wilke, D., Rutledge, R. (Radiation Therapy – Class 2004)

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7. Awards	3
7.1. MRS Program and Discipline Specific	
7.2. General Scholarships, Bursaries and Awards	
8. Financial Aid	6
9. Curriculum	7
9.1. Nuclear Medicine	
9.2. Radiological Technology	
9.3. Radiation Therapy	
9.4. Curriculum Redesign 2007	
10. Evaluation	10
10.1. Quality of Program	
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(As of February 20th 2006)

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6. Financial Aid

Students registered in the Medical Radiation Sciences Program are eligible to receive full OSAP and UTAPS, which is administered through the Office of Admissions and Awards, at the University of Toronto. In addition students who are eligible have access to a number of bursaries, high needs bursaries and other financial grants.

Financial Aid	2003/2004	2004/2005
OSAP	\$1,506,922	\$1,798,589
UTAPS	138,900	251,120
Bursary	49,900	66,100
Disability Grant	7,972	36,793
High Needs	23,530	38,725
Aboriginal	0	5,000
Day Care Grant	0	1,400
Other grants	2,980	1,988
TOTAL	\$1,730,204	\$2,199,715

In addition a bursary administered by The Michener Institute, the **Dr. Fred Heagy Bursary** is available to Nuclear Medicine students. This \$1500 bursary is awarded to a student enrolled in the 2nd/3rd year and who is in financial need or who has medical or special learning needs causing a significant financial burden, which will jeopardize his or her ability to continue in the program. Two bursaries of \$1500 each were awarded in 2005.

7. Curriculum

Presented below are the curricula for all three disciplines in UT/TMI Medical Radiation Sciences Program for the 2006/2007 academic year.

5.4 Nuclear Medicine

Year 1

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Anatomy Radiopharmacy Clinical Behavioural Sciences I Instrumentation I Radiation Science I	Physiology Radiopharmacy (cont'd) Intro. To Pharmacology Instrumentation II Relational Anatomy	

Year 2

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Nuc Med Application I Nuc Med Health Care Delivery Nuc Med Imaging Theory I Pathobiology Selective I	Nuc Med Applications II Clinical Behavioural Sciences II Nuc Med Imaging Theory II Research Methods I Comparative Imaging Modalities	Health Care Systems Clinical Practicum I

Year 3

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Clinical Practicum II Clinical Project I OR Research Methods II	Clinical Practicum III Clinical Project I OR Research Methods II (cont'd)	Research Methods II (cont'd) Selectives II, III, IV, V & VI

5.5 Radiological Technology

Year 1

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Anatomy Fundamentals of Patient Care Human Osteology Radiographic Methodology I Radiation Science I	Physiology Imaging Modalities I Intro. To Clin. Rad Tech Radiographic Methodology II Relational Anatomy	

Year 2

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Clinical Behavioural Sciences I Imaging Modalities II Systems Methodology Pathobiology Selective I	Clinical Behavioural Sciences II Nuc Med Imaging Theory II Research Methods I Comparative Imaging Modalities Instrumentation/Digital Imaging	Health Care Systems Clinical Practicum I

Year 3

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Clinical Practicum II Clinical Project I OR Research Methods II	Clinical Practicum III Clinical Project I OR Research Methods II (cont'd)	Research Methods II (cont'd) Selectives II, III, IV, V & VI

4.3 Radiation Therapy

Year 1

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Anatomy Clinical Behavioural Sciences I Intro to Patient Care in RT Intro to Radiation Physics Radiobiology & Rad Protection	Physiology Comparative Imaging Modalities Intro. To Clinical Oncology Rad Beams & their Applications Relational Anatomy	

Year 2

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Clinical Oncology I Patient Care in RT II Treatment Planning Radiotherapy Methodology Pathobiology Selective I	Clinical Oncology II Clinical Behavioural Sciences II Research Methods I Treatment Planning (cont'd) Radiotherapy Methodology (cont'd)	Health Care Systems Clinical Practicum I

Year 3

Fall (Sept – Dec)	Spring (Jan – Apr)	Summer (May – Aug)
Clinical Practicum II	Clinical Practicum III	Research Methods II (cont'd)
Clinical Project I OR Research Methods II	Clinical Project I OR Research Methods II (cont'd)	Selectives II, III, IV, V & VI

4.4 Curricular Redesign 2007

The evolution, design and implementation of a relevant up-to-date curriculum are constant challenges. Changes in the healthcare environment and the delivery of care to the patients, necessitates regular evaluation and modification of the curriculum. A proposal to redesign the curriculum to include interprofessional education (IPE) and clinical simulation has already received Michener approval, Faculty of Medicine approval and is currently proceeding through the UT Academic Board processes. The involvement of the clinical partner sites in the development and implementation of the simulated clinical is being explored.

6 Evaluation

6.1 Quality of Program

6.1.1 Student Satisfaction with the Overall Program

Students in the all three years of the MRS Program are asked to complete a satisfaction survey every February. The following table represents student satisfaction with the Program, of the three years combined.

	Radiological Technology	Nuclear Medicine	Radiation Therapy
February 2003	95.0%	93.8%	85.0%
February 2004	95.7%	91.7%	82.0%
February 2005	95.6%	88.0%	98.1%

6.1.2 Graduate Satisfaction with the Overall Program

Graduates of the MRS Program are contacted between six to twelve months post graduation and are asked to complete a satisfaction survey. The following table represents graduates for the Classes of 2002, 2003 and 2004: data for the Class 2005 currently being collected

Class	Radiological Technology	Nuclear Medicine	Radiation Therapy
2002	92.6%	79.7%	92.6%
2003	97.5%	100%	96.4%
2004	100%	97.9%	93.8%

6.1.3 Course Evaluations

Course evaluations are completed every other year. If however, a major change has occurred with the course (i.e. significant modifications to content, methods of assessment, change in instructor, etc) or if the course has received a poor evaluation previously, a course evaluation will be conducted every year until a satisfactory rating is achieved.

6.1.4 Accreditation

Currently, the three disciplines of MRS Program have full accreditation status (6 years) with anniversary dates for Radiological Technology of Fall 2006, Nuclear Medicine of Fall 2007 and Radiation Therapy of Winter 2008. The MRS Program applied to the Canadian Medical Association Conjoint Accreditation to combine the individual discipline specific accreditations into one overall Program accreditation. Documents have been submitted and January 2007 is the anticipated site visit, in time for the expiration of the radiological technology accreditation.

6.2 Quality of Graduates

6.2.1 Employer Satisfaction

Employers of graduates of the MRS Program are contacted between six to twelve months post graduation and are asked to complete a satisfaction survey. The following table represents graduates for the Class 2002, 2003 and 2004: data for the Class 2005 currently being collected

Graduating Class	Radiological Technology	Nuclear Medicine	Radiation Therapy
2002	100% satisfied	29% v. satisfied 71% satisfied	67% v. satisfied 33% satisfied
2003	100% satisfied	70% v. satisfied 30% satisfied	100% v. satisfied
2004	100% satisfied*	100% satisfied*	100% satisfied*

**Scale used for 2004 was revised to "Satisfied" or "Dissatisfied"*

6.2.2 National Certification Results

	Radiological Technology	Nuclear Medicine	Radiation Therapy
2002	93.3%	86.4%	100%
2003	100%	100%	100%
2004	92%	78%	97%
2005	100%	88.9%	88.5%

This data indicates the % of students successful on the first write of the exam

6.2.3 Scholarly Activities

The Class of 2006 will be graduating from the MRS Program in August 2006 and as such those student who were accepted into the Research Course will not be completing the final thesis until the end of July.

6.2.4 External Awards

6.2.4.1 T.B. Hurst Award (OAMRT)

Each year, the Ontario Association of Medical Radiation Technologists (a provincial member of the national professional association) awards the **T.B. Hurst Award** to the graduate who achieves the highest score on the Canadian Association of Medical Radiation Technologists certification examination in each of the disciplines. In 2003, UT/TMI Medical Radiation Sciences students, won in all three disciplines; 2004 and 2005 saw students in the disciplines of radiation therapy and nuclear medicine win this award.

6.3 Quality of Faculty

6.3.1 Preclinical

Preclinical faculty are recruited to teach in the MRS Program from a number of departments within the Faculty of Medicine, University of Toronto; Departments of Radiation Oncology, Pharmacology, Laboratory Medicine and Pathobiology. Faculty, including guest speakers are evaluated using the appropriate Department of Radiation Oncology (DRO) evaluation form.

The Michener Institute employs twenty-four full time discipline specific faculty: 9 Radiation Therapy, 9 Nuclear Medicine and 6 Radiological Technology, of which 5 hold advanced degrees at the Masters level, with 6 more currently in progress. The faculty are evaluated by TMI at least once throughout the academic year as per the collective agreement: it is up to the individual faculty member to share the results of the evaluation with the Program Chair. The faculty, also have the opportunity to have a DRO evaluation completed.

Each year at the Department of Radiation Oncology's Annual General Meeting, the faculty member with the highest teaching effectiveness score on the DRO evaluation is recognized with an award. The Teaching Effectiveness Score for the course supervisors in the academic year 2004/2005 was 4.2 out of 5.

6.3.2 Clinical Teaching

All Clinical Coordinators responsible for students in the MRS Program have evaluations completed by students at the end of every academic year. Last year the Michener Institute established an award to recognize exceptional Clinical Coordinators, and students nominated 2 Radiation Therapy and 1 Nuclear Medicine Clinical Coordinators.

In addition the students have the opportunity to nominate outstanding clinical teachers and the awards are presented at the Department of Radiation Oncology's Annual General Meeting.

University of Toronto, Department of Radiation Oncology/
The Michener Institute for Applied Health Sciences

Medical Radiation Sciences Program

Report Prepared for

Faculty of Medicine, Education Committee

January 2007



**GREAT MINDS FOR
A GREAT FUTURE**



Table of Contents

Introduction	3
11. Admission Requirements	3
11.1. Applicant Statistics	
11.2. Current Student Numbers	
11.3. Eligible to Graduate	
12. Financial Awards	5
13. Curriculum	5
14. Evaluation	6
14.1. Quality of Program	
14.1.1. Student Satisfaction with the Overall Program	
14.1.2. Graduate Satisfaction with the Overall Program	
14.1.3. Course Evaluations	
14.1.4. Accreditation	
14.2. Quality of Graduates	
14.2.1. Employer Satisfaction	
14.2.2. National Certification Results	
14.2.3. External Awards	
14.2.3.1. T.B.Hurst Award (OAMRT)	
14.3. Quality of Faculty	
14.3.1. Preclinical	
14.3.2. Clinical	

Medical Radiation Sciences Program

Introduction

The Medical Radiation Sciences Program is a four-year second-entry professional degree/diploma program jointly developed and administered by The Michener Institute for Applied Health Sciences (Michener) and the Department of Radiation Oncology, Faculty of Medicine, University of Toronto. Academic Year 2005-2006 was the seventh year of operation, with the fifth cohort of students graduating.

The Mission and Program Goals for the MRS Program have been presented in previous reports to the Education Committee. With the implementation of the new curriculum in September 2007, the Program will be reviewing both the Mission and the Goals in light of the new curriculum focus.

3. Admission Requirements

The Medical Radiation Sciences (MRS) Program is a second entry program. If the applicant has a Master's or PhD the undergraduate courses are still reviewed, as the prerequisites ensure that each student has the background necessary to be successful in the Program.

5. A minimum of one year (5 credits) of university education, with one full course in each of:
 - o Biology
 - o Mathematics
 - o Physics
6. A minimum cumulative Grade Point Average (GPA) of B-

Because all lectures, seminars and clinical laboratory sessions and activities are conducted in English, it is essential that students have an adequate knowledge of written and spoken English. *The minimum requirement for the TOEFL Computer-based Test is total score of 250 (written test 600) with at least 5.0 on Essay Rating.*

3.1 Applicant Statistics

2006/2007 Academic Year

Applicant Numbers	Radiological Technology	Nuclear Medicine	Radiation Therapy	TOTAL 06/07	TOTAL 05/06	% Increase
Total Number of Applicants	128	143	207	478	413	15.7%
From UofT	28	64	78	170	125	36.0%
From Other Universities	100	79	129	308	288	6.9%
Successful Candidates	35	38	65	138	133	3.8%

3.2 Current Student Numbers

Enrollment	Radiological Technology	Nuclear Medicine	Radiation Therapy	TOTAL
Class 2009	36	39	65	140
Class 2008	33	32	63	128
Class 2007	25	34	64	123

3.3 Eligible to Graduate

Eligible to Graduate	Radiological Technology	Nuclear Medicine	Radiation Therapy	TOTAL
June 2006 *	1	1	3	5
November 2006*	23	30	62	115
January 2007**	-	1	-	1
November 2007**	25	34	64	123

* *Already graduated*

** *As of January 12th, 2007*

8. Financial Awards

Students registered in the Medical Radiation Sciences Program are eligible to receive full OSAP and UTAPS, which is administered through the Office of Admissions and Awards, at the University of Toronto. In addition students who are eligible have access to a number of bursaries, high needs bursaries and other financial grants.

Financial Aid	2003/2004	2004/2005	2005/2006
OSAP	\$1,506,922	\$1,798,589	\$2,482,848
UTAPS	138,900	251,120	41,209
Bursary	49,900	66,100	60,000
Disability Grant	7,972	36,793	19,440
High Needs	23,530	38,725	4,000
Aboriginal	0	5,000	0
Day Care Grant	0	1,400	1,200
Other grants	2,980	1,988	14,920
TOTAL	\$1,730,204	\$2,199,715	\$2,623,617

- 55% of MRS students receive OSAP. Total Amount = \$2,482,848
- Total Grant = \$140,769
(Day Care Grant 1%, Disability Grant 14%, High Needs Grant 3%, Miscellaneous Grant 11%, MRS Bursary 43%, UTAPS 29%)
- Number of scholarships administered by UofT = 17. Total amount = \$22,869
(“Aiming For The Top”= 42%, External awards = 50%, Kinsman Scholarship = 4%, The Chancellor’s Scholarship = 2%, Rosalind Murray Bradford = 2%)

9. Curriculum

A proposal to redesign the MRS Program curriculum to include interprofessional education (IPE) and clinical simulation received Michener approval and Faculty of Medicine approval early 2006 (see March 6th 2006 – Education Committee minutes and Faculty Council minutes of March 27th, 2006). The curriculum redesign then received approval on May 31, 2006 and June 1, 2006 at Academic Policy and Programs Committee and Academic Council respectively.

Course development and approvals are currently underway. Several stakeholder meetings have been, and continue to be held to ensure changes to curriculum are reflective, and logistically feasible, for current health care practice and the partner clinical sites. The new curriculum is to be implemented with the intake of September 2007.

10. Evaluation

4.1 Quality of Program

10.1.1. Student Satisfaction with the Overall Program

Students in the all three years of the MRS Program are asked to complete a satisfaction survey every February. February 2006 data is in the process of being analyzed.

10.1.2. Graduate Satisfaction with the Overall Program

Graduates of the MRS Program are contacted between six to twelve months post graduation and are asked to complete a satisfaction survey. Data for the Class 2005 are currently being analyzed. The Class 2006 graduated in August 2006 and therefore information will not be collected until February-August 2007.

10.1.3. Course Evaluations

Course evaluations are completed every other year. If however, a major change has occurred with the course (i.e. significant modifications to content, methods of assessment, change in instructor, etc) or if the course has received a poor evaluation previously, a course evaluation will be conducted every year until a satisfactory rating is achieved.

10.1.4. Accreditation

The Accreditation Team from the CMA completed the site visit January 15-17, 2007. Following interviews with Program Administration, didactic and clinical faculty, students, managers and various other stakeholders; the Program was given a very positive unofficial verbal report by the Accreditation Team. The official report will be available in 2 months time.

10.2. Quality of Graduates

10.2.1. Employer Satisfaction

Employers of graduates of the MRS Program are contacted between six to twelve months post graduation and are asked to complete a satisfaction survey. Data for the Class 2005 are currently being analyzed. The Class 2006 graduated in August 2006 and therefore information will not be collected until February-August 2007.

10.2.2. National Certification Results

	Radiological Technology	Nuclear Medicine	Radiation Therapy
2003	82.4 (88.7)	68.4 (64)	98.3 (98.8)
2004	92.7 (92.5)	78.9 (93.8)	96.9 (97)
2005	100 (95)	89.3 (87.1)	87.5 (87)
2006	84 (88.1)	90.6 (89.5)	97.1 (90.4)

*This data indicates the % of students successful on the first write of the exam
% in (..) indicates National Average*

10.2.3. External Awards

10.2.3.1. T.B. Hurst Award (OAMRT)

Each year, the Ontario Association of Medical Radiation Technologists (a provincial member of the national professional association) awards the **T.B. Hurst Award** to the graduate who achieves the highest score on the Canadian Association of Medical Radiation Technologists certification examination in each of the disciplines. In 2003, UT/Michener Medical Radiation Sciences students, won in all three disciplines; 2004, 2005 and 2006 saw students in the disciplines of radiation therapy and nuclear medicine win this award. New for 2006, the award was also presented to a graduate of a Magnetic Resonance Imaging (MRI) program and the first MRI recipient was a graduate of the MRS Program.

10.3. Quality of Faculty

10.3.1. Preclinical

Each year at the Department of Radiation Oncology's Annual General Meeting, the MRS faculty and the guest speaker with the highest teaching effectiveness score on the UTDR0 evaluation is recognized with an award. The Teaching Effectiveness Scores for 2005/2006 were: Course Supervisors: 4.0 / 5.0

Guest Lecturers: 4.4 / 5.0

10.3.2. Clinical Teaching

All Clinical Coordinators responsible for students in the MRS Program have evaluations completed by students at the end of every academic year. In 2006 the Michener established an award to recognize exceptional Clinical Coordinators, and students nominated 5 Radiological Technology Clinical Coordinators and one of those won the overall award.

In addition the students have the opportunity to nominate outstanding clinical teachers and the awards are presented at the Department of Radiation Oncology's Annual General Meeting. For 2005/2006 two individuals were recognized; both were clinical coordinators - one in radiation therapy the other in nuclear medicine.

University of Toronto, Department of Radiation Oncology/
The Michener Institute for Applied Health Sciences

Medical Radiation Sciences Program

Report Prepared for

Faculty of Medicine, Education Committee

January 2008



Table of Contents

Introduction	3
1. Admission Requirements	3
1.1. Applicant Statistics	
1.2. Current Student Numbers	
1.3. Eligible to Graduate	
2. Awards.....	5
3. Financial Awards	5
4. Curriculum	6
5. Evaluation	7
5.1. Quality of Program	
5.1.1. Student Satisfaction with the Overall Program	
5.1.2. Graduate Satisfaction with the Overall Program	
5.1.3. Course Evaluations	
5.1.4. Accreditation	
5.2. Quality of Graduates	
5.2.1. Employer Satisfaction	
5.2.2. National Certification Results	
5.2.3. External Awards	
5.2.3.1. T.B.Hurst Award (OAMRT)	
5.3. Quality of Faculty	
5.3.1. Preclinical	
5.3.2. Clinical	

Medical Radiation Sciences Program

Introduction

The Medical Radiation Sciences Program is a four-year second-entry professional degree/diploma program jointly developed and administered by The Michener Institute for Applied Health Sciences (Michener) and the Department of Radiation Oncology, Faculty of Medicine, University of Toronto. Academic Year 2006-2007 was the eighth year of operation, with the sixth cohort of students graduating.

The Mission and Program Goals for the MRS Program have been presented in previous reports to the Education Committee. With the implementation of the new curriculum in September 2007, the Program will be reviewing both the Mission and the Goals in light of the new curriculum focus.

1. Admission Requirements

The Medical Radiation Sciences (MRS) Program is a second entry program. If the applicant has a Master's or PhD the undergraduate courses are still reviewed, as the prerequisites ensure that each student has the background necessary to be successful in the Program.

1. A minimum of one year (5 credits) of university education, with one full course in each of:
 - o Biology
 - o Mathematics
 - o Physics
2. A minimum cumulative Grade Point Average (GPA) of B-

Because all lectures, seminars and clinical laboratory sessions and activities are conducted in English, it is essential that students have an adequate knowledge of written and spoken English. *The minimum requirement for the TOEFL Computer-based Test is total score of 250 (written test 600) with at least 5.0 on Essay Rating.*

1.1 Applicant Statistics

2007/2008 Academic Year

Applicant Numbers	Radiological Technology	Nuclear Medicine	Radiation Therapy	TOTAL 07/08	TOTAL 06/07	% Increase
Total Number of Applicants	161	138	237	536	478	12.1%
From UofT	51	62	103	216	170	27.1%
From Other Universities	110	76	134	320	308	3.9%
Successful Candidates	40	35	68	143	138	3.6%

1.2 Current Student Numbers

Enrollment	Radiological Technology	Nuclear Medicine	Radiation Therapy	TOTAL
Class 2010	40	35	68	143
Class 2009	37	37	62	136
Class 2008	32	33	63	128

1.3 Eligible to Graduate

Eligible to Graduate	Radiological Technology	Nuclear Medicine	Radiation Therapy	TOTAL
November 2007*	25	32	60	117
January 2008**	0	0	1	1
May 2008**	0	0	1	1
November 2008**	32	33	54	119

* Already graduated

** As of January 17th, 2008

2. Awards

Students registered in the Medical Radiation Sciences Program are eligible to apply for several awards, bursaries and scholarships administered by both the University of Toronto and The Michener Institute for Applied Health Sciences (Michener).

There have been no changes to the number or content of the awards since the last MRS Program report presented in January 2007.

3. Financial Awards

Students registered in the Medical Radiation Sciences Program are eligible to receive full OSAP and UTAPS, which is administered through the Office of Admissions and Awards, at the University of

Toronto. In addition students who are eligible have access to a number of bursaries, high needs bursaries and other financial grants.

Financial Aid	2003/2004	2004/2005	2005/2006	2006/2007
OSAP	\$1,506,922	\$1,798,589	\$2,482,848	\$2,540,744
UTAPS	138,900	251,120	41,209	52,000
Bursary	49,900	66,100	60,000	60,000
Disability Grant	7,972	36,793	19,440	0
High Needs	23,530	38,725	4,000	6,500
Aboriginal	0	5,000	0	0
Day Care Grant	0	1,400	1,200	0
Other grants	2,980	1,988	14,920	29,562
TOTAL	\$1,730,204	\$2,199,715	\$2,623,617	\$2,688,806

- 1 52% of MRS students receive OSAP. Total Amount = \$2,540,744
- 2 Total Grant = \$148,062
(Bursary 41%, High Needs Grant 4%, Other Grant 20%, UTAPS 35%)
- 3 Number of scholarships administered by UofT = 12. Total amount = \$16,897
("Aiming For The Top" = 51%, External awards = 31%, St. Michael's College In-Course = 9%, UofT Scholar = 9%)

4. Curriculum

After receiving all levels of approval at the Michener Institute and University of Toronto, the Medical Radiation Sciences Program has been actively developing and redesigning the curriculum. The first intake of students into the new curriculum commenced in September 2007.

The MRS curriculum has been redesigned to include several courses that are interprofessional in nature, so that MRS students can learn with, from and about other healthcare professional students. Students entering the MRS Program in September will undertake a number of interprofessional education courses; specifically courses that focus on communication, professionalism, collaborative patient care, leadership in healthcare and research.

Several of the discipline specific courses have been revised with some courses incorporating new material based on current clinical practice. For example students in all three disciplines will have as a component of their core curriculum a full course entitled "Integrated CT Imaging Theory & Practice." No other programs in Ontario are educating their students to this level of practice. In addition, a clinical simulation semester, both interprofessional and discipline specific, will be implemented in the summer of 2009. Currently course development and approvals are underway for the academic year 2008/2009.

There is representation from the MRS Program on several working committees organized through the Office of Interprofessional Education. As directed by the Council of Health Sciences Deans (CHSD), UT health professional students will participate in a longitudinal curriculum to acquire core competencies needed to provide patient-centered care, focusing on an interprofessional collaborative team approach.

5. Evaluation

5.1 Quality of Program

5.1.1 Student Satisfaction with the Overall Program

Students in all three years of the MRS Program are asked to complete a satisfaction survey every February. The following table represents student satisfaction with the Program, of the three years combined. Data for 2007 is currently being analyzed.

	Radiological Technology	Nuclear Medicine	Radiation Therapy
February 2003	95.0%	93.8%	85.0%
February 2004	95.7%	91.7%	82.0%
February 2005	95.6%	88.0%	98.1%
February 2006	93.2%	93.3%	94.8%

5.1.2 Graduate Satisfaction with the Overall Program

Graduates of the MRS Program are contacted between six to twelve months post graduation and are asked to complete a satisfaction survey. Survey questions were altered for the Class 2005 therefore cannot be compared to previous years. Data for the Class 2006 are currently being analyzed. The Class 2007 graduated in August 2007 therefore information will not be collected until February-August 2008.

In the new format, graduates were asked to rate the questions on 5-point Likert scale; Strongly Agree, Agree, Disagree, Strongly Disagree, Not Applicable. The following are the compiled results for the categories Strongly Agree and Agree.

Q1: The didactic education you received prepared you well for your clinical education

	Radiological Technology	Nuclear Medicine	Radiation Therapy
2005	66.7%	100%	76.5%

Q2: The clinical education you received prepared you well for future employment

	Radiological Technology	Nuclear Medicine	Radiation Therapy
2005	100%	85.7%	100%

5.1.3 Course Evaluations

Course evaluations are completed every other year. If however, a major change has occurred with the course (i.e. significant modifications to content, methods of assessment, change in instructor, etc) or if the course has received a poor evaluation previously, a course evaluation will be conducted every year until a satisfactory rating is achieved.

5.1.4 Accreditation

In January 2007, a ten-member team from the Canadian Medical Association (CMA) Conjoint Accreditation process visited the MRS Program. After conducting two full days of interviews with leadership, faculty, students and the clinical partners for all three disciplines, the preliminary oral report was extremely positive, with the team members praising the Program as a whole. There were recommendations for the Program to review two administrative issues, which the Program completed and submitted further documentation. Consequently, all three disciplines of MRS Program have been granted full accreditation status of six years.

5.2 Quality of Graduates

5.2.1 Employer Satisfaction

Employers of graduates of the MRS Program are contacted between six to twelve months post graduation and are asked to complete a satisfaction survey. Data for the Class 2006 are currently being collected.

Graduating Class	Radiological Technology	Nuclear Medicine	Radiation Therapy
2002	100% satisfied	29% v. satisfied 71% satisfied	67% v. satisfied 33% satisfied
2003	100% satisfied	70% v. satisfied 30% satisfied	100% v. satisfied
2004	100% satisfied*	100% satisfied*	100% satisfied*
2005	100% satisfied	100% satisfied	100% satisfied

*Scale used for 2004 onwards was revised to "Satisfied" or "Dissatisfied"

5.2.2 National Certification Results

	Radiological Technology	Nuclear Medicine	Radiation Therapy
2003	82.4 (88.7)	68.4 (64)	98.3 (98.8)
2004	92.7 (92.5)	78.9 (93.8)	96.9 (97)
2005	100 (95)	89.3 (87.1)	87.5 (87)
2006	84 (88.1)	90.6 (89.5)	97.1 (90.4)
2007	96 (94.2)	83.9 (82.8)	98.2 (89.2)

*This data indicates the % of students successful on the first write of the exam
% in (..) indicates National Average*

5.2.3 Scholarly Activity

There were 28 students, primarily in the radiation therapy discipline, in the Class of 2006 who were accepted in to the Research Methods II course, and 14 in the Class 2007. Several of the students presented their research findings at provincial and national conferences. One project won the **Ed Carpen Student Exhibit Award** at the Annual General Meeting of the Ontario Association of Medical Radiation Technologists (OAMRT).

5.2.4 External Awards

5.2.4.1 T.B. Hurst Award (OAMRT)

Each year, the Ontario Association of Medical Radiation Technologists (a provincial member of the national professional association) awards the **T.B. Hurst Award** to the graduate who achieves the highest score on the Canadian Association of Medical Radiation Technologists certification examination in each of the disciplines. In 2003, UT/Michener Medical Radiation Sciences students, won in all three disciplines; 2004, 2005, 2006 and 2007 saw students in the disciplines of radiation therapy and nuclear medicine win this award.

5.3 Quality of Faculty

5.3.1 Preclinical

Each year at the Department of Radiation Oncology's Annual General Meeting, the MRS faculty and the guest speaker with the highest teaching effectiveness score on the UTDRO evaluation is recognized with an award.

The overall Teaching Effectiveness Scores for 2006/2007 were: Course Supervisors: 3.9 / 5.0

Guest Lecturers: 4.5 / 5.0

5.3.2 Clinical Teaching

All Clinical Coordinators responsible for students in the MRS Program have evaluations completed by students at the end of every academic year. In 2007 the Michener established an award to recognize exceptional Clinical Coordinators, and students nominated 5 Radiological Technology Clinical Coordinators and one of those won the overall award.

In addition the students have the opportunity to nominate outstanding clinical teachers and the awards are presented at the Department of Radiation Oncology's Annual General Meeting. For 2006/2007 two individuals were recognized; both were clinical coordinators - one in radiation therapy the other in radiological technology.