Radiologic Science Degree Completion Program

2008-09 Assessment Report

Oregon Institute of Technology
Medical Imaging Technology Department
Radiologic Science Degree Completion Program Assessment
2008-09

I. Introduction

The Radiologic Science (RDSC) Degree Completion Program began in 1996 and is one of three degree completion programs offered by the Department of Medical Imaging Technology at Oregon Institute of Technology.

The structure of the program allows registered radiologic technologists (RT) to pursue their Bachelor of Science degrees without coming to campus. This is accomplished by using the medical facilities where students are employed (or of their choice) as sites for temporary clinical practice, to fulfill the requirements of courses with labs, and the external capstone course, RDSC 411.

Eighty-eight credits are granted for the core radiography curriculum for registered technologists in good standing with the American Registry of Radiologic Technology (ARRT). A 62 credit block of math, communications, science, and remaining general education credits are taken from OIT for courses available online, or at a college in the student's locale. The remaining block of 50 credits is taken online from OIT.

During the early years of the program enrollment was slow, with little increase. The creation of a dedicated distance education office was greatly beneficial in promoting the program. From the Fall of 2002, through the Fall of 2007, the number of students coming into the program were 8, 8, 8, 12, 25, and 29, respectively. The number of graduates from 2002 through 2006 was 1, 2, 3, 1, and 4, respectively.

II. Mission, Objectives, and Student Learning Outcomes

In Fall 2008, the program faculty affirmed the following mission, objectives, and student learning outcomes for the program

Radiologic Science Degree Completion Program Mission Statement:

The mission of the Radiologic Science Degree Completion Program is to provide ARRT registered Radiologic Technologists a Bachelor of Science degree from a distance education program that furthers the student's knowledge, clinical practice, and performance of examinations while practicing competent patient care and safety in the advanced modalities of Radiologic Technology.

Program Objectives:

1. Maintain a degree completion curriculum with emphasis on math, science, and communications.

2. Provide a BS degree in Radiologic Science with a core of courses directly applicable to the technologist-student seeking advancement or a leadership role in the profession.

3. Evaluate the distance student's practice of providing compassionate healthcare in the clinical setting

4. Prepare graduates to obtain positions in the advanced modalities, management, sales, applications, education, and other career options available to Bachelor of Science degree graduates.

5. Place students in the clinical setting of various modalities, enabling them to gain hands-on experience and form new networks.

6. Provide a quality degree program that serves a remote population of students efficiently, and recognizes the achievement of passing the national registry.

7. Address quality of healthcare issues through the continued learning of working professionals..

8. Provide a meaningful capstone experience in a single advanced imaging subject.

Student Learning Outcomes:

1. Demonstrated knowledge of the concepts and principles behind the operation of special modality imaging machines and associated equipment.

2. Demonstrated professional judgment and appropriate interpersonal communication with colleagues and superiors.

3. Demonstrated critical thinking and problem solving skills

4. Demonstrated proficiency in patient care

5. Utilization of effective written and oral communication.

6. The ability to critique advanced modality images for technical quality and diagnostic value.

7. Will demonstrate magnetic field precautions and radiation safety for self, staff, and patients as set forth by the ALARA standards.

8. Observe, assist, and perform examinations of Computed Tomography, Magnetic Resonance, Arteriography, and Mammography or Quality Assurance.

9. Demonstrate the ability to perform intensive clinical practice in a special modality, or demonstrate the ability to complete a project in a clinical or educational setting.

III. SLO Three Year Assessment Cycle

A three-year cycle for the assessment of the program's student learning outcomes is shown below in Table 1.

Radiologic Science Outcome Assessment	**2007 2008**	**2008 2009**	**2009 2010**	**2010 2011**
1. Demonstrated knowledge of concepts and principles behind the operation of special modality imaging machines and associated equipment	F (356)			
2. Demonstrated professional judgment and appropriate interpersonal communication with colleagues and superiors			F	
3. Demonstrated critical thinking and problem solving skills	W (BIO 335)			
4. Demonstrated proficiency in patient care	S (326)			
5. Utilization of effective written and oral communication			W	
6. Able to critique advanced modality images for technical quality and diagnostic value.		W-S (366)		
7. Will demonstrate magnetic field precautions and radiation safety for self, staff, and patients as set forth by the ALARA standards.		S (355?)		
8. Observe, assist, and perform examinations of Computed Tomography, Magnetic Resonance, Arteriography, and Mammography or Quality Assurance.			S	
9. Demonstrate the ability to perform intensive clinical practice in a special modality, or demonstrate the ability to complete a project in a clinical or educational setting.		F (411)		

Table 1. Three year Assessment Cycle

IV. Summary of 2008-09 Assessment Activities

The program faculty formally assessed the learning outcomes summarized below. These outcomes have been mapped to the curriculum as shown in Appendix A.

Student Learning Outcome #6 Able to critique advanced modality images for technical quality and diagnostic value

Winter of 2009 provided no opportunities for assessment for these reasons.

1. Cardiovascular Interventional Technology was moved from the winter term to Spring in 2008, for the purpose of allowing a new instructor more time to prepare to offer the

distance course. It was slated to return to winter this year, but for loading purposes is remaining in spring.

2. Mammography was a second option for SLO 6, which was the alternate course planned to survey. Mammography typically has low enrollment due to it being an elective, with QA/QC as the option. This year, however, no one enrolled.

3. The only course left available in winter was Radiographic Pathology. It is didactic, with multiple choice testing for assessment. This is also a new course, now in its second year, and it was enlightening to realize that there are no SLOs which address a strictly information based course with no clinical component. Nevertheless, it was examined for possible applications to SLO #6, (Able to critique advanced modality images for technical quality and diagnostic value) which was the only objective that promised possibilities.

The two course objectives that were examined for their potentials were:
1. Classify some diseases in terms of their relative attenuation of X-rays.
The effect of disease on radiographic technique is a significant consideration for the study of radiographic pathology, for it provides a direct application of knowledge of the subject. However, the applications are not great in number, so it was doubtful that much data could be obtained. On examination of all the tests in all the units not one question was identified relative to this objective.
2. Name what modalities are best used to visualize and diagnose the covered pathologic conditions.
This objective was less applicable in that physicians who order examinations are responsible to order correctly, not technologists. Knowledge of the diagnostic value of specific modalities is still useful information because technologists may enter into discussions with ordering physicians, or may bring a dubious order to the attention of a radiologist who has the means to change it. On examination of the tests only one question was identified relative to this objective.

Strengths, Weaknesses, Actions.

Although the SLO itself was not assessed, the result of this investigation revealed that two course objectives were identified that are not assessed.

As an aside, two questions on the nervous system unit were found to be in error. This information will be passed on to the instructor as constructive criticism.

Student Learning Outcome #7. Will demonstrate magnetic field precautions and radiation safety for self, staff, and patients as set forth by the ALARA standards.

Spring 2009, RDSC 355: CT

Three courses had potential for SLO 7. Magnetic Resonance, which is not offered this term, RDSC 326 (CIT) and 355 (CT), both of which deal with radiant energy. The instructor for 355 surveyed his course and found no applicable material, which was not deemed to be a problem. This is because radiation safety and protection are basic to the

radiologic technology curriculum for students from any accredited program, and is fundamental to the everyday practice of the working techs taking CIT.

The CT course had 10 good questions on radiation safety: Three in quiz 2 and six in test 2. There were 8 students enrolled in the course. Results are as follows.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Quiz 2 question 3	MC	right/wrong	75%	5/8 62.5%
Quiz 2 question 4	MC	right/wrong	75%	8/8 100%
Quiz 2 question 5	MC	right/wrong	75%	1/8 12.5%
Quiz 2 question 6	MC	right/wrong	75%	5/8 62.5%
Test 2 question 15	MC	right/wrong	75%	8/8 100%
Test 2 question 16	MC	right/wrong	75%	6/8 75%
Test 2 question 17	MC	right/wrong	75%	6/8 75%
Test 2 question 21	MC	right/wrong	75%	8/8 100%
Test 2 question 40	MC	right/wrong	75%	6/8 75%
Test 2 question 48	MC	right/wrong	75%	7/8 87.5%
Average % of all 10				60/80 75%

Table 5. Assessment Results for SLO #7, RDSC 355, Spring 2009

Strengths, Weaknesses, Actions.
Although the averaged total met the benchmark of a passing grade at 75%, and although the sample size is small, certain questions are problematic. The course instructor will be given these results for consideration.

Student Learning Outcome #9. Demonstrate the ability to perform intensive clinical practice in a special modality, or demonstrate the ability to complete a project in a clinical or educational setting.

Fall 2008, with completion in Winter 09

RDSC 411: Clinical Externship
As the capstone course for the program, the criteria for completion of the competency evaluations (Direct assessment #1) is mastery. The performance criteria are evaluated on a

pass or no pass basis, and students observe and practice until they feel ready to perform a competency exam. If they do not pass every criteria, they must repeat the exam (up to three times) until they do. It is up to the student how many practice exams are completed prior to testing, which is dependent on their self-confidence and the modality they are training in.

Direct assessment # 2 is a subjective, professional evaluation performed by the clinical instructors at the student's extern facility. The six performance criteria selected are those indicative of supporting SLO #9.

Direct Assessment # 1
The program faculty assessed this outcome in RDSC 411 Special Radiologic Science Externship during fall 2008 using supervisor competency evaluations and the performance criteria described in Table 5 below.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Performance Evaluation				
Properly interpret patient requisition	Supervisor observation	1 pt per item	100%	100% x 5
Patient care& safety	Supervisor observation	1 pt per item	100%	100% x 5
Preparation of physical facility	Supervisor observation	1 pt per item	100%	100% x 5
Efficient use of time & energy	Supervisor observation	1 pt per item	100%	100% x 5
Correct use of equipment	Supervisor observation	1 pt per item	100%	100% x 5
Radiation protection	Supervisor observation	1 pt per item	100%	100% x 5
Image Evaluation				
Center & align part	Supervisor observation	1 pt per item	100%	100% x 5
Correctly position part/patient	Supervisor observation	1 pt per item	100%	100% x 5
Proper contrast/density	Supervisor observation	1 pt per item	100%	100% x 5
Image/scan marked appropriately	Supervisor observation	1 pt per item	100%	100% x 5
Correct patient info on image	Supervisor observation	1 pt per item	100%	100% x 5
Evidence of radiation protection on image	Supervisor observation	1 pt per item	100%	100% x 5
Image properly evaluated	Supervisor observation	1 pt per item	100%	100% x 5

Table 5. Assessment Results for SLO #9, RDSC 411, Fall 2008 with follow-up in Winter

Strengths, Weaknesses, Actions.

The level of mastery was accomplished by all students on their first tries. This indicates that they were sufficiently prepared by the number of exams they practiced, prior to being tested.

No weakness or needed actions are evident at this time.

Direct Assessment #2

The program faculty assessed this outcome in RDSC 411 Special Radiologic Science Externship during fall 2008, and followed up in winter 2009, using supervisor competency evaluations and the performance criteria described in Table 4 below.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results as class averages
#3. Quality of work	Supervisor observation	0, 70%, 80%, 90%, or 100%	80%	91.8
#4. Comprehension of examinations	Supervisor observation	0, 70%, 80%, 90%, or 100%	80%	92.7
#6. Perseverance	Supervisor observation	0, 70%, 80%, 90%, or 100%	80%	95.4
#7. Judgment/critical thinking	Supervisor observation	0, 70%, 80%, 90%, or 100%	80%	91.8
#10. Attitude toward criticism	Supervisor observation	0, 70%, 80%, 90%, or 100%	80%	95.4
#12. Initiative	Supervisor observation	0, 70%, 80%, 90%, or 100%	80%	95.4

Table 4. Assessment Results for SLO #7, RDSC 411, Fall 2008

Strengths, Weaknesses, Actions.

The five students, in four different modalities, rated by five different clinical instructors, demonstrated performance in the criteria supporting SLO # 9 at a high level of accomplishment.

It is notable that the lowest score obtained by any student in any category was 80%.

These results are reflective of the efforts of these degree completion students, who are highly motivated and success oriented.

The results are also reflective of the structure of the clinical externship and the mechanism of the assessments. It has proven to be satisfactory in all cases, and has provided the opportunity for students to excel in learning given their desire to so and their ability to take initiative and persevere though a difficult challenge.

No weakness or needed actions are evident at this time.

Indirect Measure #1

Prior to performing competency evaluations students observe and participate in examinations as they learn. When confident they are ready they ask their clinical instructor to evaluate them, and they are on their own. In addition to these practice numbers they perform 12 competency evals with as much variety as their chosen modality allows.

The great variance in the numbers (for which there is no set minimum) is partly dependent on the student's abilities and confidence. The other factor is the modality. Although the student working in the cath lab only did 31 practice exams, there is a higher degree of redundancy of those exams, and, the length of the exam is most often greater, even extending into hours for difficult cases.

	Modality	**Practice exams logged**
Student 1	Mammography	90
Student 2	Computed Tomography	> 450
Student 3	Echo + research paper	50
Student 4	Cath lab	31
Student 5	CT	218

Strengths, Weaknesses, Actions.

Based on the success of the completion of the competency exams, without need for repeats, allowing students to choose how many practice exams they do before testing has proven to be non-restrictive for those whose confidence is high, and provides ample opportunities to develop confidence for those who are tentative.

No weakness or needed actions are evident at this time.

Indirect Measure #2

Indirect measure 2 is a weekly journal reporting done by the students. These are open ended anecdotal reports, which students use to recount their progress and successes, as well as their frustrations and, sometimes, embarrassments. The work they report on and how much they learn, adds validity to the passage of their competency exams, and their scores on professional evaluations.

The weekly journal reports, (as well as the professional evaluations and competency exams) are kept with assessment data, and are available for examination. What follows are a sampling of comments that typify some of the positive experiences they had.

Sampling of Weekly Journal Entries

The end of this quarter is exciting and sad at the same time. Exciting because I'm going to have a life back, and sad because I'm going to miss this group and CT.

Wow, it's almost done. This quarter went so quickly. I'm continuing to gain confidence in my work and signing off on exams... I'm really going to miss working with this group.

This week I spent a lot of time in a cardiac class. I learned a lot from this class about the formation of clots in the arteries and what causes them to form. I also scrub my first Left Heart Cath and Right Heart completely by myself without my preceptor even scrubbed in. It was a good milestone for me.

I am performing mammograms with more confidence.. During the course of this externship I was required to obtain a California mammography license to accompany my ARRT certification and obtain 12 CE's in mammography and another 6 CE's specifically in digital mammography

Performed a stress echo on a coworker. Got an ego boost because I nailed it the first time. Stress echoes entail pre limited parasternal and apical views, followed by the patient running on the treadmill. When the pt reaches their max HR we perform the stress echo. All images must be acquired within 1 minute s/p running or else you lose the stress induced Lt Ventricular wall motion activity.

Starting to actually feel comfortable with a handful of exams, which is a nice point to have hit.

I've really been enjoying working in Echo because of the procedure/technical independence which is a big change from working in the physician directed cath lab.

Besides that I can set up a room and tray, turn the US or X-ray machine on and off, enter info into the X-Ray console and US machine, ask pts all the final verification questions and give a time out, shave and scrub the area of access, sterilely drape a patient, freeze and save an ultrasound image for IJ access, take a spot image when asked so by the rad or just photo-file one of their flouro ones, turn the 5 minute flouro alarm off, send US or X-Ray images to PACS, stock and produce product when needed (most things as long as they don't require fingerprint keys that I don't have like for expensive stents and filter), dress a venous access or drainage devices, assist the patient onto and off of the table and room, get and take a patient back to run holding, etc.

Strengths, Weaknesses, Actions.

The addition of the weekly journal entries into the discussions tool in Blackboard has proven to be an effective means of communication and keeping tabs on student progress. Some students write long reports, but the one weakness of the tool is found in those students who need prodding to do it. For this reason a point value will be assigned to fulfill the requirement.

V. Summary of Student Learning Outcomes

The program faculty conducted formal assessment of three student learning outcomes during 2008-09.

Student Learning Outcome #6. Able to critique advanced modality images for technical quality and diagnostic value**.**

In RDSC 366 two course objectives were identified that were not assessed in the course.

Student Learning Outcome #7. Will demonstrate magnetic field precautions and radiation safety for self, staff, and patients as set forth by the ALARA standards.

The benchmark was met as an overall average, but not for all individual questions. The course instructor will be given these results for consideration.

Student Learning Outcome #9. Demonstrate the ability to perform intensive clinical practice in a special modality, or demonstrate the ability to complete a project in a clinical or educational setting.

Examination of the data showed that for this group the experience provided a context for exploration of modalities that are many times difficult for technologists to gain entrance to, and enabled study and performance at a level which affords opportunities for advancement, which is a significant objective of this degree completion program. No immediate refinements have been deemed necessary.

Although the objectives do not allow for reporting critical work that has been done on the program itself, it is notable that as a result of difficulties these students encountered numerous steps have been taken to deal with the obstacles of securing a clinical site, including the preparation of an affiliation agreement, new statements added to the program brochure and distance education website, and a letter of introduction and explanation to department heads. These initiatives have been completed and implemented.

VI. Changes Resulting from Assessment

Follow-up assessment of MRI (From winter 08)

Deficiencies found last year, in the MRI course, were discussed with the instructor. Improvements were made and re-assessed during the 2008-09 year.

SLO #1. Demonstrated knowledge of the concepts and principles behind the operation of special modality imaging machines and associated equipment.

37 categorized questions were re-sampled (See Appendix B)

Performance Criteria Understanding of:	Assessment Method	Measurement Scale	Minimum Acceptable Performance	2007 Results as %	2008 Results as %
T1	Test questions	0 or 1	75% passing	78.6	100
T2	Test questions			23.8	100
SE pulse sequences	Test questions			78.6	88.6
Pulse sequences (other)	Test questions			69	91.6
TR, TE, TI	Test questions			74	93.3
Shims, gradients, RF probe	Test questions			91	93.5

Strengths, Weaknesses, Actions.

The results of the sampling from 2007 were sent to the MRI instructor for consideration and change. The data on this page shows the results from 2007 (7 students) compared to 2008 (6 students). There was improvement in every category, and the benchmark has been met.

Follow-up assessment of Cardiovascular Interventional Technology (From Spring 08)

Deficiencies found last year, in the CIT course, were discussed with the instructor. Improvements were made and re-assessed during the 2008-09 year.

SLO #4. Demonstrated proficiency in patient care

19 categorized questions were re-sampled. Six students were enrolled

Performance Criteria	**Assessment Methods**	**Measurement Scale**	**Minimum Acceptable Performance**	**Results**
Questions on patient care procedures and pharmaceuticals and drug administration	Questions from First exam of RDSC 326	% of students correctly answering representative questions	90% average of 19 questions	**96.4** (88.8) (6 students)
Pharmaceuticals and drug administration	Questions from First exam of RDSC 326	% of students correctly answering catagorized questions	90 % average of questions	**88.8** (91.6)
Questions on patient care procedure	Questions from First exam of RDSC 336	% of students correctly answering catagorized questions	90% average of 3 questions	**100** (77.7)

Strengths, Weaknesses, Actions.

The results of the sampling from 2008 were shared with the instructor for consideration and change. The data on this page shows the results from 2009 in bold (6 students) compared to 2008 in parenthesis (9 students). There was improvement in every category but that on Pharmaceuticals. The few number of students in the sample yields low reliability, nevertheless, the average of the two samplings is 90.2, and the questions on patient care procedures that was so low (77.7) came up to 100%. The benchmark has been met.

Appendix A
SLO-Curriculum Matrix

Curriculum	SLO 6 Advanced Modalities	SLO 7 Radiation Safety	SLO 9 Advanced Modality: Clinical
BIO 335			
BIO 336			
BUS 316			
BUS 317			
RDSC 326	x	x	
RDSC 354	x	x	
RDSC 355	x	x	
RDSC 356	x	x	
RDSC 365			
RDSC 366			
RDSC 411			x

Appendix B

Repeat sampling of data collection from final exam of RDSC 356 MRI
6 students completed course, 37 categorized questions sampled

Learning outcome 1. Demonstrated knowledge of the concepts and principles behind the operation of special modality imaging machines and associated equipment.

The results of the sampling from 2007 was sent to the MRI instructor for consideration and change. The data on this page shows the results from 2007 (7 students) compared to 2008 (6 students). There was improvement in every category, and the benchmark has been met.

Final Examination Questions data

Questions where grouped by the topics of: T1, T2, Spin Echo Pulse Sequence, Pulse sequences, TR, TE, TI, Coils-function of shim, gradient, and RF probes.

Numbers in parentheses are the numbers of students who marked a correct answer for each question

2007 T1 – Q.35(6), 36(7), 37(2), 48(7) Total 22/28=78.6%
2008 T1 – Q.35(6), 36(6), 37(6), 48(6) Total 24/24=**100%**

2007 T2 – Q.19(2), 39(1), 40(2) Total 5/21=23.8%
2008 T2 – Q.19(6), 39(6), 40(6) Total 18/18 =**100%**

2007 Spin Echo Pulse Sequence – Q.41(4),43(5),46(5),50(6),56(6),91(7) 33/42= 78.6%
2008 Spin Echo Pulse Sequence – Q.41(6),43(6),46(5),50(5),56(4),91(6) 34/36= **88.6%**

2007 Pulse sequences (RF pulse, diagrams) – Q.42(7),54(1),63(6),95(7),96(3),99(5) 29/42= 69%
2008 Pulse sequences (RF pulse, diagrams) – Q.42(6),54(4),63(5),95(6),96(6),99(6) 29/30= **91.6%**

2007 TR, TE, TI – Q. 51(3),53(6),69(5),74(5),75(7) Total 26/35= 74.3%
2008 TR, TE, TI – Q. 51(5),53(5),69(6),74(6),75(6) Total 28/30= **93.3%**

2007 Coils-function of shim, gradient, RF probes (diagrams) –
Q.27(4),32(7),63(6),65(7),66(7),70(7),72(6),80(7),81(7),82(7),84(6),97(7),98(5)
Total 83/91 = 91%
2008 Coils-function of shim, gradient, RF probes (diagrams) –
Q.27(6),32(6),63(6),65(6),66(6),70(6),72(6),80(6),81(5),82(6),84(3),97(6),98(5)
Total 73/78 = **93.5%**