

**Oregon Institute of Technology  
Medical Imaging Technology Department  
Radiologic Science Program Assessment  
2013-2014**

## **I. Introduction**

The Radiologic Science program at Oregon Institute of Technology Klamath Falls campus is entering its 63<sup>rd</sup> year of educating future Radiologic Technologists. The program is proud of its strong retention rates from the sophomore (professional courses) to the senior year (externship). Because of limited space and teacher ratio, the radiology program limits the selection numbers to 48 students into the sophomore professional level each year. The program generally graduates between 44-48 students a year. There were 44 students that graduated June 2014. The first attempt pass rate of the American Registry of Radiologic Technologists (ARRT) national examination has been 99.5% over the past five years with only one of 217 graduates requiring a second attempt to successfully pass the registry exam. The pay scale range of those reporting for the 2014 graduating class was \$22/hour to \$29/hour. The average annual starting salary for graduates reporting full-time employment was \$53,571.

## **II. Summary of Program Purpose, Objectives and Student Learning Outcomes**

The Radiologic Science faculty established the program purpose, objectives, and student learning outcomes in fall 2007 and reviewed fall 2012. The RDSC program director presented this to the advisory board spring 2012, the board fully supported the program purpose, objectives and learning outcomes.

### **Program Purpose**

The purpose of the Radiologic Science Bachelor's Degree Program at Oregon Institute of Technology is to provide graduates with the knowledge, clinical skills, and compassion that will allow them to become exemplary medical imaging technologists and future leaders in radiology and advanced imaging professions.

### **Educational Objectives**

The Radiologic Science program prepares graduates to:

- Be advanced leaders in the profession.
- Be compassionate, caring healthcare professionals.
- Be eligible, well-prepared, and able to sit for and pass the ARRT credentialing examination.
- Have immediate job placement within six months of graduation.
- Work in advanced imaging fields and sit for advanced imaging registries.

## **Expected Student Learning Outcomes**

The Radiologic Science student will:

1. Demonstrate knowledge of x-ray physics and related math.
2. Demonstrate professional conduct and ethical decision making.
3. Demonstrate teamwork while conducting patient procedures.
4. Demonstrate effective critical thinking and problem solving skills.
5. Demonstrate effective patient care skills.
6. Utilize both written and oral communication effectively.
7. Recognize quality diagnostic images for both technical and anatomical criteria and have the technical ability to correctly repeat images when the quality is not adequate for diagnostics.
8. Demonstrate radiation safety for self, staff, and patients as set forth by the ALARA standards.
9. Demonstrate an understanding of advanced multiple ARRT imaging modalities and the need for lifelong learning.

## **Additional Student Learning Opportunities**

RDSC students have additional learning opportunities through participation in Association of Collegiate Educators in Radiologic Technology (ACERT) conferences held in Las Vegas each year and attendance at the Oregon Society of Radiologic Technologists conference. The Radiologic Science student club participates in a joint venture with the Federal Fish and Wildlife Services of Klamath Falls, to identify fish species through digital imaging of the fish. In addition the junior imaging students have joined forces with the natural science department to image and record complete anatomical structures of cadavers each year. RDSC students are provided optional opportunities to participate in multidisciplinary simulation lab experience emphasizing team work with the nursing, respiratory therapy and the Cascades East resident physician programs.

The RDSC faculty has taken steps to better didactically prepare students for the ARRT registry examination in three advanced imaging modalities. RDSC355 Computed Tomography (CT) has been re-written to better match the ARRT expectations for CT. RDSC 354 Mammography is currently in alignment with the ARRT expectations. Finally, in addition to RDSC 356 Magnetic Resonance an elective Medical Imaging Technology advanced magnetic resonance course was developed and delivered spring term 2014. These steps to prepare RDSC students for advanced imaging modalities demonstrate the convictions of the faculty to motivate graduates for lifelong learning.

All of the 2014 graduates were successful in completing the 69 competencies required by the ARRT earning eligibility to take the national registry exam. Of these 44 students, 23 indicated they were successful in completing the competency requirements for eligibility to take one of the advanced imaging modality exams.

Senior RDSC students participate in an 11 month externship in a health care facility where they are given the opportunity to apply and refine their didactic training into practical application. They are each mentored by a clinical instructor and work side by side with experienced

radiologic technologists to better hone their skills. Students record all exams they participate in and complete 69 competency studies required by the ARRT to sit for the national registry examination. During the extern experience students are provided the opportunity to participate in specialty imaging modalities for 12 weeks. It is the student's prerogative to determine whether to spend their time experiencing one, two or three modalities.

By the completion of the senior year students are prepared to sit for the national registry examination for general radiography. It should be noted that some students have also completed the competencies required to take the examination for various specialty modalities as well.

### III. Three-Year Cycle for Assessment of Student Learning Outcomes

The current cycle of assessment is shown in Table 1.

<b>Radiologic Science Outcome Assessment</b>	<b>2013 2014</b>	<b>2014 2015</b>	<b>2015 2016</b>
1. Demonstrate knowledge of x-ray physics and related math.		X	
2. Demonstrate professional conduct and ethical decision making.			X
3. Demonstrate teamwork while conducting patient procedures.			X
4. Demonstrate effective critical thinking and problem solving skills	X		
5. Demonstrate effective patient care skills		X	
6. Utilize both written and oral communication effectively	X		
7. Recognize quality diagnostic images for both technical and anatomical criteria and have the technical ability to correctly repeat images when the quality is not adequate for diagnostics			
8. Demonstrate radiation safety for self, staff, and patients as set forth by the ALARA standard.		X	
9. Demonstrate an understanding of advanced multiple ARRT imaging modalities and the need for lifelong learning	X		X

Table 1. Three year cycle for assessment of student learning outcomes.

#### **IV. Summary of 2013-14 Assessment Activities**

The program faculty formally assessed three student learning outcomes this year, as follows.

##### **Student Learning Outcome #3: Demonstrate effective critical thinking and problem solving skills**

The faculty conducted an analysis of where this outcome is reflected in the curriculum. The mapping of this outcome to Radiologic Science courses can be found in Appendix A, Student Learning Outcome-Course Matrix, table A-1.

The program faculty used a rubric selected by the institution to study critical thinking and applied it to a situational judgment exercise. The performance criteria required were that the student: identify and clarify a problem or challenge, then evaluate the outcome of their action or decision.

The on-campus direct assessment was a performance based exercise that that junior students were required to complete while the faculty observed and rated their performance. This proved to be very labor intensive and required more time than was first allotted. It was agreed that adjustment in the grading rubric could smooth the process along with edits to the student instructions to better clarify the goal of the assessment to the students. The direct assessment tool for senior students on externship was a survey of Clinical Instructors in which they rated student proficiency in critical thinking. And finally, an indirect assessment was performed through a survey administered to senior students upon completion of externship in which they rated their level of preparedness for entry into the workforce. While the first direct assessment rubric will require adjustment, the RDSC faculty believes the data collected in all three assessments are valid.

##### **Direct Assessment #1**

Faculty assessed junior RDSC students fall term 2013 with a practical exam requiring individual students to simulate trauma radiography using a portable x-ray machine and a patient in a bed or gurney with limited mobility. Students had to draw from skills that have been learned in RDSC 201, RDSC 210, RDSC 211, RDSC 205, and RDSC 272. The students were evaluated using the Identify, Clarify, and Evaluate (ICE) model that has been implemented for the Critical Thinking ISLO. 47 RDSC junior students participated in this activity. It was the faculty's desires to have 90% of the students score a three or a four in all three criteria showing the student proficient or highly proficient in critical thinking.

Question	Limited or No Proficiency (1)	Developing Proficiency (2)	Proficiency (3)	High Proficiency (4)	Total Responses	Mean
Identification	0.00%	0.00%	4.26%	95.74%	47	3.96
Clarification	0.00%	4.26%	51.06%	44.68%	47	3.40
Evaluation	0.00%	4.26%	27.66%	68.09%	47	3.64

Table 2. Assessment results for SLO 4, RDSC 320

The faculty reviewed the results of this critical thinking exercise and concluded that the goal for this assessment was exceeded. As displayed in Table 2, 100% (47 students) met the goal in the category of identification, and 95.7% (45 students) met the goals in the categories of clarification and evaluation.

While the results of this exercise are solid, revision of the grading rubric and student instructions will be made prior to administering this assessment next year. The faculty also agreed that this assessment should be imbedded in RDSC 320 to be administered on an annual basis.

### **Direct Assessment #2**

Clinical Instructors (CI) were asked to rate students on this outcome with 16 CIs reporting, the results showed that 37.5% were highly prepared while 56.3% were sufficiently prepared, for a total of 93.8% at prepared or better.

### **Indirect Assessment #1**

The faculty assessed student learning on this outcome by surveying graduating senior extern students. The students were asked to rate their level of preparation. With 44 extern students reporting, the results showed that 61.4% indicated that they were highly prepared, while 34.1% indicated that they were adequately prepared, for a total of 95.5% at prepared or better.

After the faculty reviewed the results of the students' assessment of their critical thinking, they concluded that students have met the faculty's expectations. In addition both students and clinical instructors are satisfied with the level of student proficiency in critical thinking and problem solving skills. No further action is necessary at this time.

**PSLO #5: Utilize both written and oral communication effectively.** The faculty conducted an analysis of where this outcome is reflected in the curriculum. The mapping of this outcome to the Radiologic Science curriculum can be found in Appendix A-2.

*Written Communication*

**Direct Assessment #1**

The faculty assessed written communication in RDSC 410 Externship Winter 2011, using case studies graded with a rubric. There were 44 students assessed, results by proficient and highly proficient are listed in table 3 below.

Assessment method	Measurement scale	Minimal acceptable performance	Proficient	Highly Proficient
Rubric scored case study	1 – 4 proficiency	80% at 3 or 4	6.8%	90.9%

Table 3. Assessment results for SLO 5, RDSC410, winter 2014, faculty ratings of writing.

The faculty reviewed the results of the written case study and concluded that, 97.7% of the students were proficient in writing which meets faculty’s expectations as to the level of writing required in the imaging field for patient charting.

The faculty expressed curiosity about sharing the case studies with the communications department faculty during the last assessment cycle. Unfortunately, this could not be accommodated due to time and staffing constraints.

**Direct Assessment #2**

Clinical Instructors were asked to rate students on this outcome with 16 CIs reporting, the results showed that 56.25% were highly prepared while 37.5% were sufficiently prepared, for a total of 93.75% at prepared or better.

**Indirect Assessment # 1**

The faculty assessed student learning on this outcome by surveying graduating senior extern students. The students were asked to rate their level of preparation. With 44 extern students reporting, the results showed that 54.55% indicated that they were highly prepared, while 45.45% indicated that they were adequately prepared, for a total of 100% at prepared or better.

After the faculty reviewed the results of the students’ assessment of their written communication, they concluded that students have met the faculty’s expectations. In addition both students and clinical instructors are satisfied with the level of student proficiency in oral communication. No further action is necessary at this time.

*Oral communication*

**Direct Assessment #1**

The faculty assessed oral communication in RDSC 301 Radiographic Positioning III fall term using the OIT public speaking rubric. This direct assessment was not performed this year due to unforeseen faculty illness which lead to other faculty splitting the additional teaching load.

**Direct Assessment #2**

Clinical Instructors were asked to rate students on this outcome with 16 CIs reporting, the results showed that 62.5% were highly prepared while 31.25% were sufficiently prepared, for a total of 93.75% at prepared or better.

**Direct Assessment #3**

The faculty assessed oral communication in RDSC 410 Externship Winter 2011, using case study presentations graded by the CIs with a rubric. There were 44 students assessed, results by proficient and highly proficient are listed in table 4 below.

Assessment method	Measurement scale	Minimal acceptable performance	Proficient	Highly Proficient
Rubric scored case study	1 – 4 proficiency	80% at 3 or 4	9.1%	90.9%

Table 4. Assessment results for SLO 5, RDSC410, winter 2014, faculty ratings of oral communication.

The faculty reviewed the results of the case study presentations and concluded that, 100% of the students were proficient in writing which meets faculty’s expectations as to the level of oral presentation required in the imaging field.

**Indirect Assessment # 1**

The faculty assessed student learning on this outcome by surveying graduating senior extern students. The students were asked to rate their level of preparation. With 44 extern students reporting, the results showed that 54.55% indicated that they were highly prepared, while 45.45% indicated that they were adequately prepared, for a total of 100% at prepared or better.

After the faculty reviewed the results of the students’ assessment of their oral communication, they concluded that students have met the faculty’s expectations. In addition both students and clinical instructors are satisfied with the level of student proficiency in oral communication. No further action is necessary at this time.

**PSLO #9: Demonstrate an understanding of advanced multiple ARRT imaging modalities and the need for lifelong learning**

The faculty conducted an analysis of where this outcome is reflected in the curriculum. The mapping of this outcome to the Radiologic Science curriculum can be found in Appendix A-3.

**Direct Assessment #1**

To address the concept of lifelong learning the faculty chose to look at five years of postgraduates from the RDSC field to assess how many have successfully obtained an advanced modality certification. This verification is available through the American Registry of Radiologic Technologist ARRT website. Faculty expect 25% of graduates five years out should have at least one additional modality certification. Table 5 shows the results for this assessment.

<b>Modalities</b>	<b>Year 5</b>
CT	32
MRI	9
CI/VI	3
Mammography	17
QA	0
Bone Density	3
Percent of students with advanced modality certification	26.5%

Table 5. Five year post graduate modality certification

The numbers above do not take into account the 52 (23.3%) graduates that could not be found on the ARRT web-site due to name changes or other unknown reasons. When only taking into account the graduates that could be located on the ARRT web-site, the percentage of successfully earned advanced imaging modality certificates increased to 34.5% for Oregon Tech graduates.

The Radiologic Science faculty concluded that RDSC graduates are pursuing lifelong learning opportunities by successfully acquiring advanced modality certifications which require completing ARRT mandatory competencies and passing the ARRT examination.

In the Radiologic Science profession continuing education known as continuing education units (CEU) is a yearly requirement in order to renew certification. Twenty-four CEUs must be completed every two years. In addition, if a technologist sat for a post-primary certification exam after January 2011 he/she will have to sit for the certification exam every ten years. Faculty consider this mandatory measure to be a substantial indicator of lifelong learning.

## **Direct Assessment #2**

Clinical Instructors were asked to rate students on this outcome with 16 CIs reporting, the results showed that 43.75% were highly prepared while 56.25% were sufficiently prepared, for a total of 100% at prepared or better.

## **Indirect Assessment #1**

In an indirect assessment, the Externship Coordinator surveyed 44 senior extern students in spring 2014 as to how well the program prepared them in the area of lifelong learning. With 44 extern students reporting, the results showed that 59.09 % indicated that they were highly prepared, while 36.36% indicated that they were adequately prepared, for a total of 93.45% at prepared or better.

After the faculty reviewed the results of the students' assessment of their lifelong learning, they concluded that students have met the faculty's expectations. In addition both students and clinical instructors are satisfied with the level of student preparedness to be lifelong learners. No further action is necessary at this time.

Detailed records of this assessment can be found in the Radiologic Science coordinator's notebook.

## **V. Summary of Student Learning Outcomes**

The program faculty met in June 2014 to review the assessment work for the year and drew the following conclusions.

### **ISLO #3:** Demonstrate effective critical thinking and problem solving skills

Strengths: Students met and exceeded faculty expectations.

Weaknesses: The scoring rubric was not as intuitive as it could be and the student instructions were not as clear as they could be.

Actions: Effort will be given to edit the rubric and the student instructions.

### **PSLO #5:** Utilize both written and oral communication effectively

Strengths: Students met and exceeded faculty expectations in oral and written communication.

Weaknesses: None identified at this time.

Actions: No further action is required.

### **PSLO #9.** Demonstrate an understanding of advanced multiple ARRT imaging modalities and the need for lifelong learning

Strengths: Students met and exceeded faculty expectations.

Weaknesses: None identified at this time.

Actions: No further action is required.

**Appendix A-1  
Radiologic Science  
SLO-Curriculum Map**

Courses that are shaded below indicate that the SLO above is taught in the course, students demonstrate skills or knowledge in the SLO, and students receive feedback on their performance on the SLO.

I = Introduced  
R = Reinforced  
E = Emphasized

	<b>Sophomore</b>			<b>Junior</b>			<b>Senior</b>		
<b>Fall</b>	RDSC 201	Imaging Techniques I		RDSC 301	Radiographic Positioning III	I	RDSC 410	Extern	E
	RDSC 235	Equipment Operation & Maintenance		RDSC 320	Surgical, Trauma & Mobile Radiography	R			
				BIO 336	Pathophysiology				
				RDSC 355	Computed Tomography				
<b>Win</b>	RDSC 202	Imaging Techniques II		RDSC 356	Magnetic Resonance		RDSC 410	Extern	E
	RDSC 205	Patient Care	I						
	RDSC 210	Radiographic Positioning I	I						
	RDSC 272	Radiation Protection							
<b>Spr</b>	PHY 217	Physics of Medical Imaging	E	RDSC 326	Cardiovascular/Interventional Technology	E	RDSC 410	Extern	E
	RDSC 211	Radiographic Positioning II	I	RDSC 354	Mammography				
	RDSC 233	Contrast Media Procedures	I	RDSC 365	Advanced Quality Assurance/Quality Control				
	BIO 335	Cross-Sectional Anatomy		RDSC 388	Externship Prep				
	RDSC 366	Radiographic Pathology							

**Appendix A-2  
Radiologic Science  
SLO-Curriculum Map**

**Student Learning Outcome PSLO # 5** Utilize both written and oral communication effectively

Courses that are shaded below indicate that the SLO above is taught in the course, students demonstrate skills or knowledge in the SLO, and students receive feedback on their performance on the SLO.

I = Introduced  
R = Reinforced  
E = Emphasized

	Sophomore			Junior			Senior		
<b>Fall</b>	RDSC 201	Imaging Techniques I		RDSC 301	Radiographic Positioning III	R	RDSC 410	Extern	E
	RDSC 235	Equipment Operation & Maintenance		RDSC 320	Surgical, Trauma & Mobile Radiography				
				BIO 336	Pathophysiology				
				RDSC 355	Computed Tomography				
<b>Win</b>	RDSC 202	Imaging Techniques II		RDSC 356	Magnetic Resonance		RDSC 410	Extern	E
	RDSC 205	Patient Care	R						
	RDSC 210	Radiographic Positioning I	R						
	RDSC 272	Radiation Protection							
<b>Spr</b>	PHY 217	Physics of Medical Imaging		RDSC 326	Cardiovascular/Interventional Technology	R	RDSC 410	Extern	E
	RDSC 211	Radiographic Positioning II	R	RDSC 354	Mammography				
	RDSC 233	Contrast Media Procedures		RDSC 365	Advanced Quality Assurance/Quality Control				
	BIO 335	Cross-Sectional Anatomy		RDSC 388	Externship Prep				
	RDSC 366	Radiographic Pathology							

**Appendix A-3  
Radiologic Science  
SLO-Curriculum Map**

**SLO # 9** Demonstrate an understanding of advanced multiple ARRT imaging modalities and the need for lifelong learning.

Courses that are shaded below indicate that the SLO above is taught in the course, students demonstrate skills or knowledge in the SLO, and students receive feedback on their performance on the SLO.

I = Introduced  
R = Reinforced  
E = Emphasized

	<b>Sophomore</b>			<b>Junior</b>			<b>Senior</b>		
<b>Fall</b>	RDSC 201	Imaging Techniques I		RDSC 301	Radiographic Positioning III		RDSC 410	Extern	E
	RDSC 235	Equipment Operation & Maintenance		RDSC 320	Surgical, Trauma & Mobile Radiography				
				RDSC 355	Computed Tomography	I			
				BIO 336	Pathophysiology				
<b>Win</b>	RDSC 202	Imaging Techniques II		RDSC 356	Magnetic Resonance	I	RDSC 410	Extern	E
	RDSC 205	Patient Care							
	RDSC 210	Radiographic Positioning I							
	RDSC 272	Radiation Protection							
<b>Spr</b>	PHY 217	Physics of Medical Imaging		RDSC 326	Cardiovascular/Interventional Technology	I	RDSC 410	Extern	E
	RDSC 211	Radiographic Positioning II		RDSC 354	Mammography	I			
	RDSC 233	Contrast Media Procedures		RDSC 365	Advanced Quality Assurance/Quality Control	I			
	RDSC 366	Radiographic Pathology		RDSC 388	Externship Prep	R			
	BIO 335	Cross-Sectional Anatomy							