Oregon Institute of Technology
Medical Imaging Technology Department
Diagnostic Medical Sonography Degree Completion
Program Assessment
2014-2015

I. Introduction

The Oregon Tech Diagnostic Medical Sonography degree completion program enables registered professionals in Diagnostic Medical Sonography to further their knowledge and skills necessary for career advancement, to become effective communicators, problem solvers, critical thinkers, responsible managers and leaders, and to value lifelong learning. The Bachelor of Science Degree Completion Program in Diagnostic Medical Sonography is delivered via distance education to Sonographers who are credentialed with American Registry for Diagnostic Medical Sonography (ARDMS). Students will complete required course work through the Oregon Institute of Technology Distance Education Department. Courses are delivered via Blackboard, which serves as a virtual learning environment. The Sonography Degree Completion program is presented by the Department of Diagnostic Medical Sonography (DMS). The DMS program is in the Department of Medical Imaging Technology (MIT). DMS and MIT are contained within the College of Health, Arts, and Sciences (HAS) at Oregon Tech.

The Diagnostic Medical Sonography Degree Completion program was implemented in fall 2011 as an online program. Students who are accepted into the Diagnostic Medical Sonography Degree Completion program are already registered Diagnostic Medical Sonographers working in the field who have passed their national registry exam in Diagnostic Medical Sonography. The distance delivery version began in 2011 and will expect to grow over time. The on campus Diagnostic Medical Sonography Program (DMS) began in 1997 and is one of the five Medical Imaging programs offered on the Klamath Falls campus.

II. Program Purpose, Objectives and Student Learning Outcomes

The program faculty adopted the mission, objectives, and student learning outcomes in Fall 2010 and submitted them to the Curriculum Planning Commission for approval. The faculty met in the fall of 2011 and agreed to continue with the student learning outcomes as suggested by the programmatic accrediting body known as the "Joint Review Committee of Diagnostic Medical Sonography." The current version is listed below.

Diagnostic Medical Sonography Degree Completion Program Purpose

The purpose of the Diagnostic Medical Sonography Degree Completion Program is to provide ARDMS registered Sonographers 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 Diagnostic Medical Sonography.

Program Educational Objectives

The program prepares students to:

1. Employ diagnostic sonographic imaging techniques, critical thinking skills, effective communication skills, and professional judgment.
2. Effectively apply ergonomically correct scanning techniques.
3. Successfully complete nationally recognized credential examinations.
4. Develop a dedication to independent life-long learning and professional contribution.
5. Utilize diagnostic techniques, sound judgment and good decision making to provide patient services.
6. Be leaders in the field of Diagnostic Medical Sonographers who contribute to the field on a local, regional or national level.
7. Think critically, communicate effectively and exemplify professional ethics.
8. Become lifelong learners and responsible citizens.

Expected Student Learning Outcomes

Graduates from this program will be able to demonstrate:

1. Effective oral, visual, and written communication skills.
2. The ability to work effectively in teams.
3. The ability to provide basic patient care and comfort while utilizing ethical, professionalism and HIPAA guidelines
4. Knowledge and understanding of human gross and sectional anatomy relative to normal and abnormal sonographic imaging.
5. Knowledge and understanding of human physiology, pathology and pathophysiology.
6. Knowledge and understanding of ultrasound physical principles and instrumentation.
7. Knowledge of sonographic biological effects, proper application of sonographic instrumentation relative to imaging and image quality.
8. Appropriate ergonomic scanning applications.
9. An understanding of diverse cultural and humanistic traditions in the global society.

Other Learning Opportunities

1. Annual professional meetings and conferences for sonography students include:
    - Society of Diagnostic Medical Sonography (SDMS)
    - American Institute of Ultrasound in Medicine (AIUM)
    - American College of Educators in Radiologic Technology (ACERT)
    - Eugene Ultrasound Society (EUS)
    - Other smaller study groups located in San Francisco Bay Area
    - Oregon Tech DMS Sonography Advisory Council annual meeting and Continuing Medical Education opportunity (CME)

    The location and financial responsibility remain a challenge for DMS students to attend national conferences. These meetings are held during regularly scheduled instructional terms. Students appreciate the networking and educational benefits of attending these meetings. Competition opportunities are components of the national conferences of SDMS and ACERT. Presently, international trips are unavailable to DMS students.

2. On-line professional learning opportunities for sonography students include:
   - Monthly CME directed readings associated with student SDMS Memberships
   - SDMS Webinars are available to students with SDMS Membership

   All DMS students hold student SDMS memberships and are eligible for these opportunities. The DMS faculty encourage students to participate in these offerings not only for educational benefits, but to develop and promote effective life-long learning behaviors.

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

The following are the nine main outcomes which will be assessed at a rate of three per year on a three-year cycle, as listed below in Table 1.

	Student Learning Outcomes Assessment Schedule	**2014-2015**	**2015-2016**	**2016-2017**
1.	The student will demonstrate effective oral, visual, and written communication skills			**X**
2.	The student will demonstrate the ability to work effectively in teams		**X**	
3.	A. The student will demonstrate an ability to provide basic patient care and comfort while utilizing ethical, professionalism and HIPAA guidelines		**X**	
	B. Professionalism		**X**	
4.	The student will demonstrate knowledge and understanding of human gross and sectional anatomy relative to normal and abnormal sonographic imaging.	**X**		
5.	The student will demonstrate knowledge and understanding of human physiology, pathology and pathophysiology.			**X**
6.	The student will demonstrate knowledge and understanding of ultrasound physical principles and instrumentation.	**X**		
7.	The student will demonstrate knowledge of sonographic biological effects, proper application of sonographic instrumentation relative to imaging and image quality.	**X**		
8.	The student will demonstrate appropriate ergonomic scanning applications.			**X**
9.	The student will demonstrate an understanding of diverse cultural and humanistic traditions in the global society.		**X**	

Table 1. Diagnostic Medical Sonography Assessment Cycle

IV. Summary of 2014-15 Assessment Activities

The Diagnostic Medical Sonography faculty conducted formal assessment of three programmatic student learning outcomes (PSLO's) during the 2014-15 academic year. Table 2 summarizes the 2014-15 assessment activities. The Curriculum Map located in the Appendix indicates the courses where teaching and/or learning occurs and the level to which this PSLO is taught in the program.

Table 2: Summary of 2014-2015 Assessment Activities	
Student Learning Outcome	***Assessment Method***
PLSO # 4 The student will demonstrate knowledge and understanding of human gross and sectional anatomy relative to normal and abnormal sonographic imaging.	Direct Assessment • Written Assignment/Exam • Written Case Study • DMS Practical Indirect Assessment • DMS Survey
PLSO # 6: Demonstrate knowledge and understanding of ultrasound physical principles and instrumentation.	Direct Assessment • Test Questions Indirect Assessment • Student Survey
PLSO # 7: Demonstrate knowledge of sonographic biological effects, proper application of sonographic instrumentation relative to imaging and film quality.	Direct Assessment • Written Exam • Indirect Assessment • Student Survey

Table 2: Summary of 2014-2015 Assessment Activities

Student Learning Outcome # 4: The student will demonstrate knowledge and understanding of human gross and sectional anatomy relative to normal and abnormal sonographic imaging.

Direct Assessment #1-Written Pathology Exam Assessment

The faculty assessed this outcome in DMS 365 Sonographic Pathology in Fall term 2014 by means of a written examination. The faculty rated the proficiency of 4 online using the performance criteria described in Table 3 below.

Table 3: DMS Written Pathology Exam Assessment Table

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Sonographically identifies specific gross human anatomy and surrounding structures in sagittal section	Written exam in DMS 365	1 point each for correct problem	80 % class average	100%
Sonographically identifies specific gross human anatomy and surrounding structures in transverse &/or coronal section(s)	Written exam in DMS 365	1 point each for correct problem	80 % class average	100%
Identifies anatomic and relative sonographic landmarks	Written exam in DMS 365	1 point each for correct problem	80 % class average	95%
Identifies sonographic modifications for pathologic differential diagnoses	Written exam in DMS 365	1 point each for correct problem	80 % class average	100%

Table 3. Direct Assessment Results for PSLO #4 in DMS 365, fall 2014

The level of mastery was accomplished by all students based on the stated performance citeria. No further action is required at this time. Students in DMS 365 performed at acceptable levels on items assessed via exam questions. The data indicates that the target group evaluated were proficient in knowledge and understanding of human gross and sectional anatomy relative to normal and abnormal sonographic imaging**.** DMS 365 was selected as a course because students are taught distinguishing differential diagnosis and appearance of sonographic pathology. The results are summarized in the table seen above.

Direct Assessment #2- DMS Written Case Report

The faculty assessed this outcome in DMS 430, senior externship, by means of a case report. The faculty rated the proficiency of the students using the performance criteria described in Table 4

Table 4: DMS Written Case Study Assessing Sonographic Pathology				
Performance Criteria	**Assessment Method**	**Measurement Scale**	**Minimum Acceptable Performance**	**Results**
Identifies and explains case	DMS Case Study Rubric	1-4 scale, % at 3 or 4	80% at 3 or 4	95%
Evaluates assumptions	DMS Case Study Rubric	1-4 scale, % at 3 or 4	1-4 scale, % at 3 or 4	95%
Evaluates evidence	DMS Case Study Rubric	1-4 scale, % at 3 or 4	1-4 scale, % at 3 or 4	95%
Differential diagnosis	DMS Case Study Rubric	1-4 scale, % at 3 or 4	1-4 scale, % at 3 or 4	100%

Table 4. Results for PSLO #4 in DMS 430, Spring Term 2015

At this time no further action is needed since students were able to describe clinical history and related symptoms relevant to the case study with excellence. The overall written presentations were professional in appearance, grammar, references; proper annotation and use of JDMS guidelines. The case studies followed HIPAA guidelines regarding confidentiality. These cases represent accounts of the impact of sonography on patients with rare pathology, or unusual combinations of pathology. Cases that include excellent examples of normal anatomy, or the first reported visualization of normal anatomic structures, or the use of new technology may also be reported. Sonograms that clearly demonstrate the sonographic findings are included, as well as an account of the patient's symptoms, other diagnostic findings, treatment, prognosis, and a brief discussion of the disease.

Indirect Assessment #1- DMS Student Survey to Assess Knowledge and Understanding of Ultrasound Physical Principles and Instrumentation.

To accompany the assessment above, the faculty indirectly assessed this outcome in DMS 430 Spring Term via survey, by asking one online students to rate their level of competency. We had only one student to survey since this is still a fairly new program to Oregon Tech. These results are summarized, shown in Table 5 below.

Table 5: DMS Student Survey to Assess Knowledge and Understanding of Ultrasound Physical Principles and Instrumentation.				
Performance Criteria	**Assessment Method**	**Measurement Scale**	**Minimum Acceptable Performance**	**Results**
Knowledge and Understanding of Ultrasound Physical Principles and Instrumentation.	Student survey	1-4 scale, % at 3 or 4	80 % at 3 or 4	100%

Table 5. Indirect Assessment Results for PSLO #6 in DMS 430, Spring 2015

No follow up recommendations are suggested at this time.

Student Leaning Outcome PSLO #7: The student will demonstrate knowledge of sonographic biological effects, proper application of sonographic instrumentation relative to imaging and image quality.

Direct Assessment #1- Biological Effects

The faculty evaluated student knowledge of ultrasound biologic effects in DMS 254 Junior Laboratory III, Spring Term, 2015. This assessment was conducted by means of a written examination. The faculty rated the proficiency of 4 online students using the performance criteria described in Table 6 below.

Table 6: DMS Student Survey to Assess Understanding of Sonographic Biological Effects, Proper Application of Sonographic Instrumentation Relative to Imaging and Image Quality.				
Performance Criteria	**Assessment Method**	**Measurement Scale**	**Minimum Acceptable Performance**	**Results**
Demonstrate knowledge of sonographic In Vivo biologic effects	Written Examination	1 point each for correct problem	80 % class average	100%
Demonstrate knowledge of sonographic In Vitro biologic effects	Written Examination	1 point each for correct problem	80 % class average	100%
Demonstrate knowledge of sonographic MI biologic effects	Written Examination	1 point each for correct problem	80 % class average	100%
Demonstrate knowledge of sonographic TI Written Examination biologic effects	Written Examination	1 point each for correct problem	80 % class average	95%

Table 6. Direct Assessment Results for PSLO #7 in DMS 355, Spring 2015

These students were able to meet standards and exceeded all performance criteria standards for this reassessment. No further action is required at this time.to demonstrate knowledge of sonographic biological effects, proper application of sonographic instrumentation relative to imaging and image quality.

V. Evidence of Student Learning

This information can be found within the body of this report. Based on this information it can be concluded that students enrolled in the Diagnostic Medical Sonography at Oregon Institute of Technology are able to fulfill programmatic goals and expectations.

Summary of department discussions on strengths and weaknesses in student learning:

Student Learning Outcome #4: The student will demonstrate knowledge and understanding of human gross and sectional anatomy relative to normal and abnormal sonographic imaging.

Students demonstrated acceptable performance related to all performance criteria for this PSLO.

Student Learning Outcome #6: Demonstrate knowledge and understanding of ultrasound physical principles and instrumentation.

Students demonstrated acceptable performance in all criteria for physical principles and instrumentation requiring direct or indirect relationships and in questions which solved physics and instrumentation problems

Student Learning Outcome #7: The student will demonstrate knowledge of sonographic biological effects, proper application of sonographic instrumentation relative to imaging and image quality.

Students demonstrated acceptable performance on all criteria for this PSLO.

B. Faculty decisions on program improvements, including person(s) responsible and timelines:
Faculty is becoming more comfortable with ongoing assessment. Whenever possible, assessment information is correlated with other programmatic data sets. Better programmatic generated timelines will be generated with all members' input and quarterly schedules.

VI. Changes Resulting from Assessment

The 2014-2015 assessment revealed no charges were necessary. Based on this assessment knowledgebase baselines continue to improve. The program will continue its mission to provide skilled teaching methods.

VII. Summary of Student Learning

In a spring faculty meeting, the DMS faculty reviewed the assessment results and reached the following overall conclusions.

Student Learning Outcome #4

Limited information due to low enrollment, no action needed at this time.

Student Learning Outcome #6

Limited information due to low enrollment, no action needed at this time.

Student Learning Outcome #7

Limited information due to low enrollment, no action needed at this time.

Appendix A1
Student Learning Outcome-Course Matrices

Student Learning Outcome # 4: The student will demonstrate knowledge and understanding of human gross and sectional anatomy relative to normal and abnormal sonographic imaging. Table A1 demonstrates the mapping of this outcome to DMS courses.

I=Introduce R=Reinforce E=Emphasize

DMS Course	**Summer**	**Fall**	**Winter**	**Spring**
Sophomore				
DMS 223 Abdominal I				
DMS 252 Sophomore Lab I				
DMS 224 Abdominal II				
DMS 253 Sophomore Lab II				
DMS 225 Abdominal III				
DMS 254 Sophomore Lab III				
DMS 234 Pelvic Sonography				
Junior				
DMS 335 Patient Care				
DMS 352 Junior Lab I		R/E		
DMS 337 Breast Sonography				
DMS 346 MSK Sonography				
DMS 342 Survey Echo				
DMS 316 Survey of VT			I	
DMS 353 Junior Lab II				
DMS343 Fetal Echo & Neonatal Sono			I	
DMS 372 OB Sonography II			I	
DMS 354 Junior Lab III				
DMS 365 Sonographic Pathology			E	
DMS 388 Extern Prep				
DMS 373 OB Pathology			I	
Senior				
DMS 430 I, II, III, IV Externship	R/E	R/E	R/E	R/E

Table A2. Student Learning Outcome #1 -Course Matrix
Identified courses indicate that the PSLO above is taught in the course, students demonstrate skills or knowledge in the SLO, and students receive feedback on their performance on the PSLO.

I = Introduced R = Reinforced E = Emphasized

Appendix A2

Student Learning Outcome-Course Matrices

Student Learning Outcome # 6: The student will demonstrate knowledge and understanding of ultrasound physical principles and instrumentation. Table A2 demonstrates the mapping of this outcome to DMS courses.

I=Introduce R=Reinforce E=Emphasize

DMS Course	**Summer**	**Fall**	**Winter**	**Spring**
Sophomore				
DMS 223 Abdominal I				
DMS 252 Sophomore Lab I				
DMS 224 Abdominal II				
DMS 253 Sophomore Lab II				
DMS 225 Abdominal III				
DMS 254 Sophomore Lab III				
DMS 234 Pelvic Sonography				
Junior				
DMS 335 Patient Care				
DMS 352 Junior Lab I		I		
DMS 337 Breast Sonography				
DMS 346 MSK Sonography				
DMS 342 Survey Echo				
DMS 316 Survey of VT			R	
DMS 353 Junior Lab II				
DMS343 Fetal Echo & Neonatal Sono				
DMS 372 OB Sonography II				
DMS 354 Junior Lab III				R/E
DMS 365 Sonographic Pathology				
DMS 388 Extern Prep				
DMS 373 OB Pathology				
Senior				
DMS 430 I, II, III, IV Externship	E	E	E	E

Table A2. Student Learning Outcome #1 -Course Matrix

Identified courses 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

Appendix A3

Student Learning Outcome-Course Matrices
Student Learning Outcome #7: The student will demonstrate knowledge of sonographic biological effects, proper application of sonographic instrumentation relative to imaging and image quality.

I=Introduce R=Reinforce E=Emphasize

DMS Course	**Summer**	**Fall**	**Winter**	**Spring**
Sophomore				
DMS 223 Abdominal I				
DMS 252 Sophomore Lab I				
DMS 224 Abdominal II				
DMS 253 Sophomore Lab II				
DMS 225 Abdominal III				
DMS 254 Sophomore Lab III				
DMS 234 Pelvic Sonography				
Junior				
DMS 335 Patient Care				
DMS 352 Junior Lab I		I		
DMS 337 Breast Sonography				
DMS 346 MSK Sonography				
DMS 342 Survey Echo				
DMS 316 Survey of VT				
DMS 353 Junior Lab II			R	
DMS343 Fetal Echo & Neonatal Sono				
DMS 372 OB Sonography II				
DMS 354 Junior Lab III				E
DMS 365 Sonographic Pathology				E
DMS 388 Extern Prep				
DMS 373 OB Pathology				
Senior				
DMS 430 I, II, III, IV Externship	E	E	E	E

Table A2. Student Learning Outcome #1 -Course Matrix

Identified courses 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

Appendix B

Assessment time map combining Institutional Student Learning Outcomes and Programmatic Student Learning Outcomes is found in Table B1.

Table B1, three year assessment cycle for DMS PSLO.

Student Learning Outcomes Assessment Schedule		**2014-2015**	**2015-2016**	**2016-2017**
1.	The student will demonstrate effective oral, visual, and written communication skills			**X**
2.	The student will demonstrate the ability to work effectively in teams		**X**	
3.	A. The student will demonstrate an ability to provide basic patient care and comfort while utilizing ethical, professionalism and HIPAA guidelines		**X**	
	B. Professionalism		**X**	
4.	The student will demonstrate knowledge and understanding of human gross and sectional anatomy relative to normal and abnormal sono-graphic imaging.	**X**		
5.	The student will demonstrate knowledge and understanding of human physiology, pathology and pathophysiology.			**X**
6.	The student will demonstrate knowledge and understanding of ultrasound physical principles and instrumentation.	**X**		
7.	The student will demonstrate knowledge of sonographic biological effects, proper application of sonographic instrumentation relative to imaging and image quality.	**X**		
8.	The student will demonstrate appropriate ergonomic scanning applications.			**X**
9.	The student will demonstrate an understanding of diverse cultural and humanistic traditions in the global society.		**X**	

Table B1. Diagnostic Medical Sonography Assessment Cycle