Diagnostic Medical Sonography
2007-08 Assessment Report

I. Introduction

The Diagnostic Medical Sonography (DMS) program was begun in 1997 and is located on the Klamath Falls campus. Enrollment for the past five years has been growing from 64 in fall 2002 to its current enrollment of 77 as of fall 2007. The program is selective and admits pre-Medical Imaging students into the professional courses at the sophomore level. Due to this selectivity, the program has good retention graduation rates; 22 seniors graduated in spring 2007. The most recent graduate survey indicated an average entry salary for DMS graduates at $61,800.

II. Program Purpose, Objectives and Student Learning Outcomes

The DMS faculty formally reviewed the program's purpose, objectives and student learning outcomes, listed below, during a fall 2007 convocation retreat.

DMS Program Purpose
To provide the residents of Oregon, the Pacific Northwest and surrounding regions with graduates possessing knowledge and behaviors to earn Bachelor of Science degrees in Diagnostic Medical Sonography, the clinical skills necessary to become competent, ethical and caring imaging professionals, and the foundation for life-long learning.

Program Educational Objectives
The program prepares graduates to:

1. utilize effective communication skills
2. employ diagnostic sonographic imaging techniques, critical thinking skills, and professional judgment to clinical applications
3. employ ergonomically correct scanning techniques
4. to successfully complete nationally recognized credential examinations
5. to instill the importance of life-long learning and professional contribution

Expected Student Learning Outcomes
Graduates from the DMS program will be able to:

1. Demonstrate effective oral, non-verbal, and written communication skills
2. Demonstrate the ability to work effectively in teams
3. Demonstrate an ability to provide basic patient care and comfort
4. Demonstrate knowledge and comprehension of normal gross and sectional human anatomy

5. Demonstrate knowledge and understanding of human physiology, pathology, and pathophysiology
6. Demonstrate knowledge of sonographic biological effects, proper application of sonographic instrumentation techniques relating to imaging and film quality.
7. Image abdominal and superficial structures and to differentiate between normal and abnormal anatomy.
8. Image gender-specific pelvic and obstetrical structures and to differentiate between normal and abnormal anatomy.
9. Demonstrate knowledge and application of ergonomic scanning techniques
10. Demonstrate an understanding of diverse cultural and humanistic traditions in the global society

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

The DMS faculty have agreed to assess the ten student learning outcomes on a three-year cycle, as listed in Table 1 below, also Appendix B.

		07-08	08-09	09-10
1	The student will demonstrate effective oral, non-verbal, and written communication skills			
2	The student will demonstrate the ability to work effectively in teams			
3	The student will demonstrate an ability to provide basic patient care and comfort			
4	The student will demonstrate knowledge and comprehension of normal gross and sectional human anatomy			
5	The student will demonstrate knowledge and understanding of human physiology, pathology, and pathophysiology			
6	The student will demonstrate knowledge of sonographic biological effects, proper application of sonographic instrumentation techniques relating to imaging and film quality			
7	The student will be able to image abdominal and superficial structures and to differentiate between normal and abnormal anatomy			
8	The student will be able to image gender specific pelvic and obstetrical structures and to differentiate between normal and abnormal anatomy			
9	The student will demonstrate knowledge and application of ergonomic scanning techniques			
10	The student will demonstrate an understanding of diverse cultural and humanistic traditions in the			

	global society			
	Key to assessing terms: Fall, Winter, Spring	F	W	S

Table 1. DMS Assessment Cycle

IV. Summary of 2007-08 Assessment Activities

DMS faculty conducted formal assessment of two student learning outcomes and an additional assessment on critical thinking during the 2007-08 academic year, as described below.

Student Learning Outcome #5: **The student will demonstrate knowledge and understanding of human physiology, pathology, and pathophysiology.**

DMS faculty conducted an analysis of where this outcome is reflected in the curriculum. The mapping of this outcome to DMS courses can be found in Appendix A.

Two direct assessment tools were developed in the fall 2007 to evaluate extern knowledge of SLO #5. The first was a rubric related to individual student case study projects. Twenty-three senior extern students submitted a written case study, using the author requirements for the Journal of Diagnostic Medical Sonography (JDMS), related to an abnormal abdominal examination scanned by the student at the assigned clinical affiliation. The minimum acceptable performance was 90% in all three of the following areas:

- A discussion of presenting symptoms and the sonographic implication related to image modification.

- The student's research of the possible differential diagnoses met by sonographic criteria found on the images and plausible specific diagnosis determined by the interpretating radiologist, laboratory/pathology results, and other imaging modalities, and incorporated options for treatment, prognosis, and morbidity and mortality.

- Examples of the personally created sonographic images to include normal and abnormal sonographic scans.

All DMS externs submitted written pathology case studies of exams they generated at their assigned clinical affiliate. Eighteen points were required to meet the benchmark for the first item above. The overall average earned was 19.23. The second item required an average of 22.5 points and resulted in an average of 22.9 points, and the third item had a benchmark of 18 with 18.13 points as the earned average. The combined total exceeded the 90% benchmark by 1%.

The second pathology assessment tool for SLO #5 was based on all pathophysiology questions given on the abdominal-superficial WebCT test (#3 fall 2007 term). Minimum acceptable performance in this area: 80% of students to be assessed with average scores of 85% or higher.

This test was created for the class of 2006 externs. These questions were not generated specifically for the assessment. Due to a glitch in the system, only 21 of the 23 externs completed the test during the assigned time frame. The benchmark of 80% of the students completing the test with an average score of 85% was met by 91% of the cohort completing the test before the deadline. WebCT #3 test was evaluated for all questions pertaining to pathophysiology type items. Five were determined to fit this criterion. Each question was assigned one point for compliance and zero for an incorrect response. The five questions resulted in percentages of 95.23, 80.95, 90.47, 80.95 and 76.19. The average of 91% of the students: 84.76% or 85%.

Extern students are performing at benchmark levels as related to physiology, pathology, and pathophysiology of the abdomen based on both case study evaluation and standard testing techniques. SLO #5 met all minimum standards and will follow the normal assessment cycle for reassessment.

Detailed records of these assessments can be found in the DMS program director's assessment notebook in the department.

Student Learning Outcome #9: The student will demonstrate knowledge and application of ergonomic scanning techniques.

DMS faculty conducted an analysis of where this outcome is reflected in the curriculum. The mapping of this outcome to DMS courses can be found in Appendix A.

SLO #9 was assessed during the fall 2007 term for students to demonstrate their knowledge and application of ergonomic scanning techniques. It is an established fact that 84-93% of sonographers in North America have reported musculoskeletal injuries due to daily work-related activities and 20% of all sonographers will have their careers ended due to musculoskeletal injuries (SDMS.org). Due to the historical ergonomic relevance, a base line assessment of sophomores during their first laboratory course was deemed necessary for repeated follow-up and an official assessment of second quarter extern students during the on-site faculty evaluations held in the fall and winter terms. A rubric was created to assess overall student sonographer body alignment techniques, ergonomic techniques while standing, digital placement while holding the transducer, and student sonographer seating alignment evaluation. The student was evaluated based on one point for being compliant or zero for non-compliance in the above criteria areas. Minimum performance: 80% of students evaluated with an 85% compliance rate.

SLO #9 Externs: The rubric created for this assessment used a measuring tool of 1 point for compliant and 0 for non-compliant. All four areas were used in addressing the competency of externs. Overall alignment techniques yielded 91% success; however, only 40% of the externs were evaluated during this term. The other items, Stance, Digit placement, and Seating alignment generated percentages of 90%, 85% and 100% respectfully. The inability to meet the 80% student benchmark requires this assessment to continue into the winter term when all externs will be individually assessed at their respective clinical sites.

Visual assessment completed in winter term with 100% of externs evaluated. Overall alignment techniques yielded 93.7% success. Stance and Digit placement, generated percentages of 93.5% and 93.5% respectfully. The final item, Seating alignment yielded a success of 99%.

Externs were asked to submit an ergonomic survey regarding routinely used ergonomic scanning applications. 82% of the students submitted the survey in the allotted time. The results for this assessment are listed below in Table 2.

Performance Criteria	Assessment Method	Measurement Scale	Target Performance	Results
1. Overall ergo skills with each patient	Rubric	1 to 4, % at 3 or 4	80%	94%
2. Proper hand and finger placement	Rubric	1 to 4, % at 3 or 4	80%	94%
3. Refrain from cable around shoulders	Rubric	1 to 4, % at 3 or 4	80%	100%
4. Align patient and table	Rubric	1 to 4, % at 3 or 4	80%	100%
5. Align chair and self	Rubric	1 to 4, % at 3 or 4	80%	100%

Table 2 Extern Ergonomic Survey Results
82% of students reporting

Externs appeared to be performing at benchmark levels related to application of ergonomic techniques in the clinical arena during the fall term. Further investigation during the winter 08 term was completed to provide 100% student evaluation. The overall performance indicated 95% compliance. Self assessment survey results indicate that student perception of ergonomic

compliance is at least 94%. Externs are compliant in all SLO #9 areas and are performing above benchmark expectations. No improvement actions necessary at this point. All reporting students exceeded the minimum performance level of 80%.

SLO #9 Sophomores: The same rubric was utilized in this assessment with a minimum benchmark of an overall ergonomic compliance of 85%. The breakdown: 83% met the overall alignment technique, the stance technique was determined N/A during the collection of the data due to the lack of necessity of this application during this stage of learning and was eliminated from the sophomore component, item three, digit placement yielded a 69% compliance rate, and the seating alignment 80%. The overall performance indicated an 81.6% compliance with 73% of the students demonstrating a combined compliance of 85.3%. Digital placement is the least compliant.

Reassessment was completed during final practical exams in DMS 253. 100% of students were reassessed in the areas failing to meet fall term benchmarks from DMS 252. Digit placement yielded 92% compliance, and the seating alignment 89%. The overall performance indicated 91% compliance with 100% of the students demonstrating 91.9%.

Fall term sophomores needed additional reinforcement to proper scanning techniques as they relate to proper ergonomic body mechanics with the greatest non-compliant area being digital placement. Prior to repeat numerical assessment, sophomore students were provided with mini in-service announcements at the beginning of winter term lab sessions during weeks 1, 2 and 5. 100% of sophomores received a short reminder of ergonomic significance in sonography at advising sessions.

Winter term reassessment of all below benchmark areas indicated overall performance exceeded target levels demonstrating 92% compliance, and digital placement criterion 5(a) reporting 96%. No improvement actions necessary at this point. All reporting students exceeded the minimum performance level of 80%.

Detailed records of this assessment can be found in the DMS program director's assessment notebook in the department.

Additional Assessment on Critical Thinking

The DMS faculty also assessed critical thinking as part of an institution-wide assessment of this outcome.

The assignment was a clinical case study: Using the JDMS Author guidelines, the 23 senior extern students were to write a clinical case study from an exam that the student successfully completed clinically during winter 2008 term. The student was to address presenting symptoms and the implication of the exam including how the scanning was modified to accommodate presenting symptoms. Student was to submit images of diagnostic quality and analyze images based on established clinical standards for diagnostic images addressing sonographic instrumentation and image resolution. Possible remedies for poor image quality were to be addressed. The student discussed patient history/condition, diagnosis based on the varied diagnostic examinations performed at the facility and incorporated radiologists reports, treatment, prognosis, morbidity and mortality. The student was expected to accurately apply technically correct sonographic and medical terminology. Presentation will be typed and bound in a professional manner, following JDMS and programmatic specified format.

The results for this assessment are listed below in Table 3.

Performance Criteria	Assessment Method	Measurement Scale	Target Performance	Results
1. Identifies and explains problem	Rubric	1 to4, % at 3 or 4	80%	100%
2. Recognizes stakeholders and contexts	Rubric	1 to4, % at 3 or 4	80%	88%
3. Frames personal responses and acknowledges other perspectives	Rubric	1 to4, % at 3 or 4	80%	88%
4. Evaluates assumptions	Rubric	1 to4, % at 3 or 4	80%	100%
5. Evaluates evidence	Rubric	1 to4, % at 3 or 4	80%	100%
6. Evaluates implications, conclusions, and consequences	Rubric	1 to4, % at 3 or 4	80%	94%

Table 3. Critical Thinking Assessment Results

No improvement actions necessary at this point. All reporting students exceeded the minimum performance level of 80%.

Detailed records of this assessment can be found in the DMS program director's assessment notebook in the department.

V. Student Learning Improvement Plan

The Diagnostic Medical Sonography faculty formally assessed the following student learning outcomes during the 2007-08 academic year.

Student Learning Outcome #5: **The student will demonstrate knowledge and understanding of human physiology, pathology, and pathophysiology.**

Strengths: Senior extern students exceeded benchmark for written pathology case studies by 1%. Additional assessment was conducted by means of an examination where the same students met benchmark projections; 91% exceeding expectations.

Areas for improvement: None at this time

Student Learning Outcome #9: The student will demonstrate knowledge and application of ergonomic scanning techniques.

Senior Strengths: Senior extern students performed clinically in all performance areas above expectations. Self assessment results of the same group yielded all reporting students exceeding minimum performance levels.

Areas for improvement: None at this time

Sophomore Strengths: Sophomores performed at 69% far below acceptable standards during their first programmatic term in the area of fore-finger/transducer placement. The other criteria met or exceeded expectations. As a result, reassessment of this group was completed during their second quarter on campus which yielded an overall performance above initial expectations.

Areas for improvement: None at this time

Critical Thinking

Strengths: Senior extern students exceeded minimum performance levels in all criteria: Indentify and explain problem, recognize stakeholders, personal responses, evaluation of assumptions, evidence, implications, conclusions, and consequences.

Areas for improvement: None at this time.

VI. Changes Resulting from Assessment

Student Learning Outcome #9: The student will demonstrate knowledge and application of ergonomic scanning techniques.

Sophomores performed at 69%, far below acceptable standards, during their first programmatic term in the area of fore-finger/transducer placement. The other criteria met or exceeded expectations.

Prior to repeat numerical assessment, sophomore students were provided with mini in-service announcements at the beginning of winter term lab sessions during weeks 1, 2 and 5. 100% of sophomores received a short reminder of ergonomic significance in sonography at advising sessions.

As a result, reassessment of this group was completed during their second quarter on campus which yielded an overall performance above initial expectations.

Both on and off campus students began discussing the importance of proper ergonomic applications without faculty facilitation. A greater awareness from the extern clinical instructors (hospital staff) was demonstrated in the annual advisory committee meeting held in May of 2008.

Areas for improvement: None at this time

Appendix A

Diagnostic Medical Sonography

DMS courses most suitable for assessing specific SLO content areas:

Course Name	Number	Student Learning Outcomes									
Sophomore Courses		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
App. of Abdominal Sono	DMS 205										
Sono Physics & Inst I	DMS 231										
Sophomore Laboratory I	DMS 252										
Cross-Sectional Anatomy	BIO 335										
General Physics	PHY 201										
Sono Abd Scanning I	DMS 224										
Sono Physics & Inst II	DMS 232										
Sophomore Laboratory II	DMS 253										
Sono Abd Scanning II	DMS 225										
Sono Laboratory III	DMS 254										
Sono Film Analysis	DMS 255										
Junior Courses											
Pelvic Sonography	DMS 333										
DMS Patient Care	DMS 335										
Junior Laboratory I	DMS 352										
Survey Vascular Tech	DMS 316										
Obstetrical Sonography I	DMS 334										
Junior Laboratory II	DMS 353										
Breast Sonography	DMS 337										
Fetal Echo/ Neonatal US	DMS 343										
Obstetrical Sonography II	DMS 344										
Junior Laboratory III	DMS 354										
Sonographic Pathology	DMS 365										
Extern Preparation	DMS 388										
Senior Courses											
DMS Externship I	DMS 430										
DMS Externship II	DMS 430										
DMS Externship III	DMS 430										
DMS Externship IV	DMS 430										

Appendix B
Diagnostic Medical Sonography Courses for Assessment

Course #	Course Name	2007-08	2008-09	2009-10
DMS 205	Applications of Abdominal Sonography			
DMS 231	Sonographic Physics & Instrumentation I			
DMS 252	Sophomore Laboratory I			
DMS 224	Sonographic Abdominal Scanning I			#7
DMS 232	Sonographic Physics & Instrumentation II			
DMS 253	Sophomore Laboratory II	#9		
DMS 225	Sonographic Abdominal Scanning II			
DMS 254	Sonographic Laboratory III			
DMS 255	Sonographic Film Analysis			#6
DMS 333	Pelvic Sonography			
DMS 335	DMS Patient Care		#2, 10	
DMS 352	Junior Laboratory I			#1
DMS 316	Survey of Vascular Technology			
DMS 334	Obstetrical Sonography I			
DMS 337	Breast Sonography			
DMS 353	Junior Laboratory II			
DMS 343	Fetal Echo and Neonatal Sonography			
DMS 344	Obstetrical Sonography II		#8	
DMS 354	Junior Laboratory III		#4	
DMS 365	Sonographic Pathology			
DMS 388	Extern Preparation			
DMS 430.1	Summer DMS Externship			
DMS 430.2	Fall DMS Externship	#9, #5		#3
DMS 430.3	Winter DMS Externship	#9, CT		
DMS 430.4	Spring DMS Externship			

Appendix C

2007-2008

Assessment cycle for the three student learning outcomes to be assessed in the 2007-2008 academic are listed for specific courses and activities in appendices A and B.

SLO #5: The student will demonstrate knowledge and understanding of human physiology, pathology, and pathophysiology	Evaluate DMS 430 (Extern-fall term) case study for content and critical thinking skills. Assessed based on existing Grading form (rubric)
	10 questions on DMS 430 Extern test #1 (PI/ABD) on webCT specific to this content area
SLO #9: The student will demonstrate knowledge and application of ergonomic scanning techniques	Following student completion of sophomore orientation in Oct 2007 and demonstration in DMS 252 (week one) students will complete behavioral practical to determine competency at week 8 by means of a rubric
	Survey current externs (DMS 430) regarding ergonomic methods. To be submitted electronically to externs on week 8.
Additional Assessment – Institutional Student Learning Outcome: Critical Thinking and Problem Solving	Evaluate DMS 430 (Extern-winter term) clinical case study using JDMS author guidelines and critical thinking rubric

2008-09

SLO #2: The student will demonstrate the ability to work effectively in teams	Fall DMS 335 Group diverse cultural poster projects. Peers and faculty will assess effectiveness by rubric
	Survey of all DMS 333 students regarding perceived ability to work effectively in teams
SLO #10: The student will demonstrate an understanding of diverse cultural and humanistic traditions in the global society.	Fall DMS 335 group projects to create cultural awareness posters in conjunction with SLO #2. Peers and faculty will assess effectiveness by rubric
SLO #4: The student will demonstrate knowledge and comprehension of normal gross and sectional human anatomy.	Spring DMS 354 evaluated by means of scanning practical
	Electronic survey will be completed at week 8 regarding student perception of this content area
SLO #8: The student will be able to image gender specific pelvic and obstetrical structures and to differentiate between normal and abnormal anatomy	Spring DMS 344. Portfolio of images created during open lab of assigned living pelvic patients and of assigned MedSim OB cases.
	10 content specific questions will be earmarked for assessment from the DMS 344 Unit Two Test
Additional Assessment – Institutional Student Learning Outcome: -----	

2009-10

SLO #1: The student will demonstrate effective oral, non-verbal, and written communication skills	Fall DMS 352 content area included with laboratory practical with patient assessments.
SLO #3: The student will demonstrate an ability to provide basic patient care and comfort	Fall DMS 430 Extern Survey submitted to extern Clinical Instructors for evaluation
	10 content specific questions incorporated in Fall extern Blackboard test.
SLO #7: The student will be able to image abdominal and superficial structures and to differentiate between normal and abnormal anatomy	Winter DMS 224 Portfolio of normal abdominal structures will be created
	One test will be dedicated to this content area and assessed by means of rubric addressing mastery
SLO #6: The student will demonstrate knowledge of sonographic biological effects, proper application of sonographic instrumentation techniques relating to imaging and film quality	Spring DMS 255 Image portfolio will be created to demonstrate instrumentation and film quality. Assessment by rubric
	Content specific questions will be included on a test.
Additional Assessment – Institutional Student Learning Outcome: -----	

Appendix D

SLO #9: Extern Survey Regarding Personal Ergonomic Skills

Please print this survey and circle the box which best identifies your sonographic ergonomic scanning skills. Please FAX the form to Cheryl Zelinsky at 541-885-1320 by Thursday of this week. Thank you for your participation.

1. I routinely attempt overall proper ergonomic skills with each patient:

Never	**< 60%** of the time	**60-80%** of the time	**90-100%** of the time
1	2	3	4

2. I routinely use proper hand/finger placement when holding the transducer

Never	**< 60%** of the time	**60-80%** of the time	**90-100%** of the time
1	2	3	4

3. I routinely refrain from placing the transducer cable around my shoulders

Never	**< 60%** of the time	**60-80%** of the time	**90-100%** of the time
1	2	3	4

4. I routinely align the patient and table to meet my needs

Never	**< 60%** of the time	**60-80%** of the time	**90-100%** of the time
1	2	3	4

5. I routinely align the scanning chair to meet my needs

Never	**< 60%** of the time	**60-80%** of the time	**90-100%** of the time
1	2	3	4