

# **Diagnostic Medical Sonography Annual Assessment Report**

## **2008-09**

### **I. Introduction**

The Diagnostic Medical Sonography Program (DMS) began in 1997 and is one of the five Medical Imaging programs offered on the Klamath Falls campus. The DMS 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 graduation retention rates. The reported one-year average retention (fall 2003 to fall 2006) is 92%. The spring 2008 graduation of 23 students yielded cohort retention of 88.8%. Enrollment trends from 2004-2008 show continued growth from 68 to 80 students. The most recent graduate survey indicated a continued increase in the median entry salary for DMS graduates at \$62,900.

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

The Sonography Advisory Council (SAC) met in May 2008. The program purpose, objectives, Programmatic Student Learning Outcomes, and Institutional Student Learning Outcomes were discussed. The commentary was directed to Critical Thinking and Ergonomics, ISLO #4 and PSLO #8, respectively. The Advisory Council Members expressed their satisfaction with entry level sonographic ergonomic skills demonstrated by the senior students. During faculty externship visitations several Extern Clinical Coordinators requested that an ergonomic in-service be included in the SAC meeting. One hour of the SAC was sanctioned as an Ergonomic Workshop in DOW 107.

The Diagnostic Medical Sonography faculty reviewed the program purpose, objectives, and learning outcomes during the fall faculty meeting in September 2008. The faculty reaffirmed the purpose and aligned the Programmatic Student Learning Outcomes assessments with Institutional Student Learning Outcomes.

#### **Diagnostic Medical Sonography 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**

##### **To prepare graduates 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 .

## **Expected Program 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. An ability to provide basic patient care and comfort.
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 film quality.
8. Appropriate ergonomic scanning applications.
9. An understanding of diverse cultural and humanistic traditions in the global society.

## **Other Learning Opportunities**

Annual professional meetings and conferences for sonography students include:

- Society of Diagnostic Medical Sonography
- American Institute of Ultrasound in Medicine
- American College of Educators in Radiologic Technology
- Eugene Ultrasound Society
- Other smaller study groups located in San Francisco Bay Area

The location and financial responsibility are a detour for DMS students. The meetings are held during regularly scheduled instructional terms, are more frequently greater than 1,000 miles from Klamath Falls. The related fees include registration, air fare, rental cars, hotel and daily expenses. Most DMS students have a rigid budget which makes attendance very challenging.

Competitions and international trips currently are unavailable to DMS students.

## **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.

<b>Student Learning Outcomes Assessment Schedule</b>		<b>2008-2009</b>	<b>2009-2010</b>	<b>2010-2011</b>
<b>1.</b>	The student will demonstrate effective oral, visual, and written communication skills			<b>X</b>
<b>2.</b>	The student will demonstrate the ability to work effectively in teams		<b>X</b>	
<b>3.</b>	The student will demonstrate an ability to provide basic patient care and comfort		<b>X</b>	
<b>4.</b>	The student will demonstrate knowledge and understanding of human gross and sectional anatomy relative to normal and abnormal sonographic imaging.	<b>Spring DMS 365</b>		
<b>5.</b>	The student will demonstrate knowledge and understanding of human physiology, pathology and pathophysiology			<b>X</b>
<b>6.</b>	The student will demonstrate knowledge and understanding of ultrasound physical principles and instrumentation.	<b>Fall DMS 231</b>		
<b>7.</b>	The student will demonstrate knowledge of sonographic biological effects, proper application of sonographic instrumentation relative to imaging and film quality	<b>Winter DMS 232</b>		
<b>8.</b>	The student will demonstrate appropriate ergonomic scanning applications			<b>X</b>
<b>9.</b>	The student will demonstrate an understanding of diverse cultural and humanistic traditions in the global society		<b>X</b>	

Table 1. Diagnostic Medical Sonography Assessment Cycle

#### **IV. Summary of 2008-09 Assessment Activities**

The DMS faculty conducted formal assessment of one programmatic student learning outcome (PSLO) during each of the three 2008-09 terms.

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

The DMS Faculty analyzed the curriculum for outcome reflected in the curriculum. A map of these identified courses is found the Appendix A, Student Learning Outcome-Course Matrices Table A1.

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

The faculty assessed this outcome in DMS 365 Sonographic Pathology in spring 2009 term using a written examination. The faculty rated the proficiency of 27 junior students using the performance criteria described in Table 2 below.

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	96%
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	96%
Identifies anatomic and relative sonographic landmarks	Written exam in DMS 365	1 point each for correct problem	80 % class average	85%
Identifies sonographic modifications for pathologic differential diagnoses	Written exam in DMS 365	1 point each for correct problem	80 % class average	82%

Table 2 Direct Assessment Results for SLO #4 in DMS 365, Spring 2009 Term

The students met all performance criteria standards for this assessment. No further action is required at this time.

### **Direct Assessment #2**

The faculty assessed this outcome in DMS 354 DMS Junior Lab III in spring 2009 using a laboratory practical test. The faculty rated the proficiency of 27 junior students using the performance criteria described in Table 3 below.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Correctly identifies specific gross human anatomy and surrounding structures in sagittal section	Lab Practical in DMS 354	1-4 scale, % at 3 or 4	80 % at 3 or 4	92%
Correctly identifies specific gross human anatomy and surrounding structures in transverse &/or coronal section(s)	Lab Practical in DMS 354	1-4 scale, % at 3 or 4	80 % at 3 or 4	96%
Correctly identifies and centers anatomic and relative sonographic landmarks	Lab Practical in DMS 354	1-4 scale, % at 3 or 4	80 % at 3 or 4	96%
Correctly identifies and corrects for detrimental artifacts potentially related to possible pathology	Lab Practical in DMS 354	1-4 scale, % at 3 or 4	80 % at 3 or 4	100%

Table 3 Direct Assessment Results for SLO #4 in DMS 354, Spring 2009 Term

The students met all performance criteria standards for this assessment. No further action is required at this time

### **Indirect Assessment**

To accompany the assessment above, the faculty indirectly assessed this outcome in DMS 365 Sonographic Pathology in Spring 2009 by asking 27 junior students to rate themselves by using the same rubric used by the faculty to assess their performance. These results are summarized using the same performance criteria, shown in Table 4 below.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Sonographically identifies specific gross human anatomy and surrounding structures in sagittal section	Student survey	1 - 4 scale, % at 3 or 4	80 % at 3 or 4	96%
Sonographically identifies specific gross human anatomy and surrounding structures in transverse &/or coronal section(s)	Student survey	1 - 4 scale, % at 3 or 4	80 % at 3 or 4	96%
Identifies anatomic and relative sonographic landmarks	Student survey	1 - 4 scale, % at 3 or 4	80 % at 3 or 4	88%
Identifies sonographic modifications for pathologic differential diagnoses	Student survey	1 - 4 scale, % at 3 or 4	80 % at 3 or 4	85%

Table 4 Student Self-Assessment Results for SLO #4 in DMS 365, Spring 2009 Term

Student confidence levels in their ability to apply these sonographic imaging differentials in both written and laboratory areas correlated with their written and performance test scores.

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

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

The DMS Faculty analyzed the curriculum for outcome reflected in the curriculum. A map of these identified courses is found the Appendix B, Student Learning Outcome-Course Matrices Table B2.

### **Direct Assessment #1**

The faculty assessed this outcome in DMS 231 in Fall 2008 term using a test with physics questions created to assess the student's application of MATH 112, the terminal

departmental mathematic course with the ultrasound physics covered in this course. The faculty rated the proficiency of 29 sophomore students using the performance criteria described in Table 5 below.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Inverse proportion relationship of frequency and wavelength	DMS Physics test	1 point each for correct problem	80 % class average	89%
Application of wavelength formula	DMS Physics test	1 point each for correct problem	80 % class average	93%
Application of pulse duration formula	DMS Physics test	1 point each for correct problem	80 % class average	100%
Simple conversion of kHz to Hz	DMS Physics test	1 point each for correct problem	80 % class average	100%
Application of intensity reflection coefficient formula	DMS Physics test	1 point each for correct problem	80 % class average	68%

Table 5 Direct Assessment Results for PSLO #6 in DMS 231, Fall 2008 Term

Five mathematic related questions were incorporated in a DMS 231 Physics and Instrumentation of Sonography test. The questions were designed to assess student long term retention of concepts from MATH 112, the terminal course required for selection into the DMS program, and math skills required to successfully complete the national ultrasound board examination in Sonographic Physics and Instrumentation. Each of the five questions was prefaced with the formula necessary to calculate the correct response.

The 29 DMS sophomore students met the performance criteria in 4/5 questions. Student strength was documented in questions with direct or indirect relationships, and in formula questions which required solving for a single component.

Student weakness was demonstrated in the question having multiple factors and a more complex formula. Learning is formative at the sophomore level. In the future, these more complex criteria will be assessed at the junior level.

Action plan: As 80% of the performance criteria components exceeded the acceptable performance level no further action will be required at this time. Faculty will consider student learning levels in the future to better determine the appropriate course for specific assessment criterion.

Detailed records of this assessment can be found in the department assessment coordinator's notebook

**Student Learning Outcome #7: Demonstrate knowledge of sonographic biological effects, proper application of sonographic instrumentation relative to imaging and film quality.**

The DMS Faculty analyzed the curriculum for outcome reflected in the curriculum. A map of these identified courses is found the Appendix B, Student Learning Outcome-Course Matrices Table B3.

SLO #7 has two specific applications: (1) biological effects and (2) sonographic imaging. To better evaluate these components direct and indirect assessment was completed for each application.

**Direct Assessment #1: Biological Effects**

The faculty evaluated student knowledge of ultrasound biologic effects in DMS 232 Sonographic Physics and Instrumentation II, Winter 2009 term by means of a written examination. The faculty rated the proficiency of 28 sophomore students using the performance criteria described in Table 6 below. The overall compliance from this direct assessment was 82-89% with an average assessment of 86%.

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	89%
Demonstrate knowledge of sonographic In Vitro biologic effects	Written examination	1 point each for correct problem	80 % class average	85%
Demonstrate knowledge of sonographic MI biologic effects	Written examination	1 point each for correct problem	80 % class average	82%
Demonstrate knowledge of sonographic TI biologic effects	Written examination	1 point each for correct problem	80 % class average	89%

Table 6 Direct Assessment Results for PSLO #7 in DMS 232, Winter 2009 Term

The students met all performance criteria standards for this direct assessment. The results of this direct assessment do not coincide with the results of the following indirect assessment. Further action is discussed in the action plan following Table 7 below.

**Indirect Assessment #1: Biological effects**

To accompany the assessment above, the faculty indirectly evaluated the same student population's perception of knowledge related to ultrasound biologic effects. The students were given time to review and clarify questions prior to completion of the survey. These results are summarized in Table 7 below.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Personal knowledge of sonographic In Vivo biologic effects	Student survey	1 - 4 scale, % at 3 or 4	80% at 3 or 4	8%
Personal knowledge of sonographic In Vitro biologic effects	Student survey	1 - 4 scale, % at 3 or 4	80% at 3 or 4	4%
Personal knowledge of sonographic MI biologic effects	Student survey	1 - 4 scale, % at 3 or 4	80% at 3 or 4	4%
Personal knowledge of sonographic TI biologic effects	Student survey	1 - 4 scale, % at 3 or 4	80% at 3 or 4	0%

Table 7 Indirect Student Self-Assessment Assessment Results for SLO #7 in DMS 232, Winter 2009 Term

Student perception of sonographic biologic effects did not meet the acceptable performance level. This weakness or skewed data may be the result of an unclear or poorly written survey, or actual lack of student knowledge of biologic effect terminology.

**Action Plan:**

Reassess Spring term in DMS 255 Sonographic Film Analysis. DMS 255 is the terminal sophomore physics and instrumentation course. DMS 255 incorporates a review of biologic effects. To assure that the direct assessment performance criteria were legitimate from DMS 232, these students will be directly reassessed using a more detailed testing method in the spring 2009 term.

A question still remains that these data were skewed due to an ineffective survey tool. Better survey methods will be used in the future to eliminate this assumption.

**Direct Reassessment #1: Biologic Effects**

Spring term 2009: DMS 255 Sonographic Film Analysis. Four questions for each of the following criteria were generated by means of a BlackBoard test. Two questions per criteria were fill-in. The results are summarized in Table 8 below.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Personal knowledge of sonographic In Vivo biologic effects	Written examination	1 point each for correct problem (4)	80 % class average	93.5%
Personal knowledge of sonographic In Vitro biologic effects	Written examination	1 point each for correct problem (4)	80 % class average	100%
Personal knowledge of sonographic MI biologic effects	Written examination	1 point each for correct problem (4)	80 % class average	100%
Personal knowledge of sonographic TI biologic effects	Written examination	1 point each for correct problem (40)	80 % class average	98%

Table 8 Direct Reassessment Results for PSLO #7 in DMS 255, Spring 2009 Term

The students met exceeded all performance criteria standards for this reassessment. No further action is required at this time. This reassessment supports the original direct assessment from winter, 2009.

### **Direct Assessment #2: Sonographic imaging**

The faculty assessed the demonstrated knowledge of sonographic instrumentation by means of a laboratory practical examination in DMS 253 Sophomore Laboratory II, Winter 2009. The faculty rated the proficiency of 28 students using the performance criteria described in Table 9 below. The performance ratings were 89-100% and yielded an average of 96% in all areas.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Demonstrate knowledge of specific sonographic instrumentation: TGC	Lab practical	1 - 4 scale, % at 3 or 4	80% at 3 or 4	100%
Demonstrate knowledge of specific sonographic instrumentation: Doppler	Lab practical	1 - 4 scale, % at 3 or 4	80% at 3 or 4	89%
Demonstrate knowledge of specific sonographic instrumentation: Measurement	Lab practical	1 - 4 scale, % at 3 or 4	80% at 3 or 4	96%
Demonstrate knowledge of specific sonographic instrumentation: Image Depth	Lab practical	1 - 4 scale, % at 3 or 4	80% at 3 or 4	96%
Demonstrate knowledge of specific sonographic instrumentation: Anatomic placement/alignment	Lab practical	1 - 4 scale, % at 3 or 4	80% at 3 or 4	100%

Table 9 Direct Assessment Results for ISLO #7 in DMS 232, Winter 2009 Term

The overall average of 96% demonstrated compliance exceeds the minimum acceptable performance. No further assessment at this time.

### **Indirect Assessment #2: Sonographic imaging**

The faculty indirectly assessed perceived sonographic instrumentation skill sets in DMS 232 Sonographic Physics and Instrumentation, II in Winter 2009. The twenty-three students who were present judged themselves, by means of a paper survey, as to their comprehended abilities too properly utilize accurate sonographic instrumentation settings in the laboratory setting. The faculty used the following rubric to evaluated these perceived skill sets. The survey results yielded scores of 95-100% with an average of 99%. These results are summarized in Table 10 below.

Performance Criteria	Assessment Method	Measurement Scale	Minimum Acceptable Performance	Results
Demonstrate knowledge of specific sonographic instrumentation: TGC	Student survey	1 - 4 scale, % at 3 or 4	80% at 3 or 4	100%
Demonstrate knowledge of specific sonographic instrumentation: Doppler	Student survey	1 - 4 scale, % at 3 or 4	80% at 3 or 4	95%
Demonstrate knowledge of specific sonographic instrumentation: Measurement	Student survey	1 - 4 scale, % at 3 or 4	80% at 3 or 4	100%
Demonstrate knowledge of specific sonographic instrumentation: Image Depth	Student survey	1 - 4 scale, % at 3 or 4	80% at 3 or 4	100%
Demonstrate knowledge of specific sonographic instrumentation: Anatomic placement/alignment	Student survey	1 - 4 scale, % at 3 or 4	80% at 3 or 4	100%

Table 10 Indirect Student Self-Assessment Assessment Results for SLO #7 in DMS 232, Winter 2009 Term

The overall average of 99% of perceived ability tallied from this tool exceeds the minimum acceptable performance. No further assessment at this time

### **Overall assessment for SLO #7**

Strengths found in this multi-level assessment for SLO#7 were actual demonstration of biological effects knowledge and laboratory practical instrumentation scanning abilities. Both areas were above minimum accepted levels. The reassessment completed in the spring term validated the original assessment's outcome.

Weakness was related to the extreme numerical variations from the indirect survey for biologic effect knowledge.

Conclusion following direct reassessment: Students exceed performance criteria for these criteria standards. The detailed reassessment test validates original direct assessment results and supports theory related to poor indirect survey tool.

No further assessment is required at this time.

Detailed records of this assessment can be found in the department assessment coordinator's notebook

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

### **A. 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.**

Strengths: Students demonstrated acceptable performance related to all performance criteria for this SLO. Students were able to identify gross human anatomy in all scanning planes in both abdominal and OB-gyn courses, and demonstration of relative landmarks. Students demonstrated appropriate knowledge of pathologic differential diagnoses in related courses.

Weaknesses: None at this time.

Actions: None required at this time.

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

Strengths: Students demonstrated acceptable performance in all criteria for physical principles and instrumentation requiring direct or indirect relationships and in questions which solved for a single component.

Weakness: Appreciated with questions having multiple factors or a more complex formula.

Actions: Faculty is reminded that learning is formative at the sophomore level and these more complex criteria should and will be assessed at the junior level. No further actions at this time.

**Student Learning Outcome #7: Demonstrate knowledge of sonographic biological effects, proper application of sonographic instrumentation relative to imaging and film quality.**

**Strengths:** Students demonstrated acceptable performance on all criteria for this SLO on an original direct assessment in the winter term. Reassessment in the spring term validated the original assessment.

**Weakness:** Better methods of creating indirect student surveys are needed. Faculty will research Survey Monkey as well as seek on-campus input from colleagues possessing these skill sets.

**Actions:** Following reassessment which validates original outcomes, no further actions are required at this time.

**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.

## Appendix A

### 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.

DMS Course	Summer	Fall	Winter	Spring
<b>Sophomore</b>				
DMS 205 Applications of Abd Sono		I		
DMS 231 Physics/Instrumentation I				
DMS 252 Sophomore Lab I		R/E		
DMS 224 Abdominal I			I	
DMS 232 Physics/Instrumentation II				
DMS 253 Sophomore Lab II			R/E	
DMS 225 Abdominal II				I
DMS 254 Sophomore Lab III				R/E
DMS 255 Sonographic Film Analysis				R
<b>Junior</b>				
DMS 333 Pelvic Sonography		I		
DMS 335 Patient Care				
DMS 352 Junior Lab I		R/E		
DMS 316 Survey of VT			I	
DMS 334 OB Sonography I			I	
DMS 337 Breast Sonography			I	
DMS 353 Junior Lab II			R/E	
DMS343 Fetal Echo & Neonatal Sono				I
DMS 344 OB Sonography II				I/R
DMS 354 Junior Lab III				R/E
DMS 365 Sonographic Pathology				R/E
DMS 388 Extern Prep				
<b>Senior</b>				
DMS 430 I, II, III, IV Externship	R/E	R/E	R/E	R/E

**Table A1. Student Learning Outcome # 4 -Course Matrix**

Courses that are shaded 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

**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.**

DMS Course	Summer	Fall	Winter	Spring
<b>Sophomore</b>				
DMS 205 Applications of Abd Sono		I		
DMS 231 Physics/Instrumentation I		I/E		
DMS 252 Sophomore Lab I		R/E		
DMS 224 Abdominal I				
DMS 232 Physics/Instrumentation II			R/E	
DMS 253 Sophomore Lab II			R/E	
DMS 225 Abdominal II				
DMS 254 Sophomore Lab III				R/E
DMS 255 Sonographic Film Analysis				R
<b>Junior</b>				
DMS 333 Pelvic Sonography				
DMS 335 Patient Care				
DMS 352 Junior Lab I		R		
DMS 316 Survey of VT			R	
DMS 334 OB Sonography I				
DMS 337 Breast Sonography				
DMS 353 Junior Lab II			R	
DMS343 Fetal Echo & Neonatal Sono				
DMS 344 OB Sonography II				
DMS 354 Junior Lab III				R/E
DMS 365 Sonographic Pathology				
DMS 388 Extern Prep				
<b>Senior</b>				
DMS 430 I, II, III, IV Externship	R/E	E	E	E

**Table A2. Student Learning Outcome # 6 -Course Matrix**

Courses that are shaded 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

**Student Learning Outcome #7: The student will demonstrate knowledge of sonographic biological effects, proper application of sonographic instrumentation relative to imaging and film quality. Table A3 demonstrates the mapping of this outcome to DMS courses.**

DMS Course	Summer	Fall	Winter	Spring
<b>Sophomore</b>				
DMS 205 Applications of Abd Sono		I		
DMS 231 Physics/Instrumentation I		I		
DMS 252 Sophomore Lab I		I		
DMS 224 Abdominal I				
DMS 232 Physics/Instrumentation II			R/E	
DMS 253 Sophomore Lab II			R/E	
DMS 225 Abdominal II				
DMS 254 Sophomore Lab III				R
DMS 255 Sonographic Film Analysis				R
<b>Junior</b>				
DMS 333 Pelvic Sonography				
DMS 335 Patient Care				
DMS 352 Junior Lab I		R		
DMS 316 Survey of VT				
DMS 334 OB Sonography I				
DMS 337 Breast Sonography				
DMS 353 Junior Lab II			R	
DMS343 Fetal Echo & Neonatal Sono				
DMS 344 OB Sonography II				
DMS 354 Junior Lab III				R
DMS 365 Sonographic Pathology				
DMS 388 Extern Prep				
<b>Senior</b>				
DMS 430 I, II, III, IV Externship	R/E	E	E	E

**Table A3. Student Learning Outcome # 7 -Course Matrix**

Courses that are shaded 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

### Diagnostic Medical Sonography Curriculum Map

	Sophomore	Junior	Senior
Fall	BIO 335 Cross-Sectional Anatomy	BUS 317 Health Care Mgmt	DMS 430 Extern
	DMS 205 Appl. Of Abd Sono	DMS 333 Pelvic Sono	
	DMS 231 Sono Phy & Instr I	DMS 335 DMS Patient Care	
	DMS 252 Soph Lab I	DMS 352 Junior Lab I	
	PHY 217 Physics of Med Imaging	SPE 321 Sm Group & Team Communication	
		Communication Elective	
Winter	DMS 224 Sono Abd Scan I	BUS 316 TQ in Health	DMS 430 Extern
	DMS 232 Sono Physics & Instr II	DMS 316 Survey of Vas Tech	
	DMS 253 Soph Lab II	DMS 334 Obstetrical Sono I	
	WRI 227 Tech Rept Writing	DMS 337 Breast Sono	
	Hum Elective	DMS 353 Junior Lab II	
	Soc Sci Elective	Math/ Sci/ SS Elective	
Spring	DMS 225 Sono Abd Scan II	DMS 343 Fetal Echo & Neonatal Sono	DMS 430 Extern
	DMS 254 Soph Lab III	DMS 344 OB Sono II	
	DMS 255 Sono Film Analysis	DMS 354 Junior Lab III	
	Bus Elective	DMS 365 Sono Pathology	
	Humanities Elective	DMS 388 Extern Prep	
	Soc Sci elective		
Summer			DMS 430 Extern

**Table B1, 2008-09 DMS Curriculum Map**

**Assessment cycle for the three student learning outcomes to be assessed in the 2008-2009 academic year is listed for specific courses and activities in Table B2.**

<b>Diagnostic Medical Sonography Student Learning Outcomes 2008-2009</b>		<b>Assessment Measures</b>
4	The student will demonstrate knowledge and understanding of human gross and sectional anatomy relative to normal and abnormal sonographic imaging.	#1 Direct. Administer a written test in DMS 365 Sonographic Pathology. The student will identify specific items in the Performance Criteria; Table 8  #2 Direct. Administer a laboratory scanning practical in DMS 354 (laboratory component of DMS 365). The student will identify specific items in the Performance Criteria; Table 9  #3 Indirect. Generate a student survey to address their perceived knowledge of the areas found on the DMS 365 written test and Laboratory Practical in DMS 354, and the test. Table 10
6	The student will demonstrate knowledge and understanding of ultrasound physical principles and instrumentation	#1 Direct: Administered a written test in DMS 231 Sonographic Physics and Instrumentation I, Fall 2008 term. The student answered questions with specific mathematic formulae as identified in the Performance Criteria; Table 2  #2 Direct Reassessment: Will administer a written test in DMS 232 Sonographic Physics and Instrumentation II, Winter 2009 term. The student will complete five word problems focused on intensity reflection coefficient. Performance Criteria in table 3  #3 Indirect assessment: The student will personally assess his/her working knowledge of mathematical skills required for success in the DMS program and what is needed to successfully write the ARDMS Physics Exam during the Winter 2009 DMS 232 course. Performance criteria found in Table 4
7	The student will demonstrate knowledge of sonographic biological effects, proper application of sonographic instrumentation relative to imaging and film quality.	#1 Direct: Administer a written test in DMS 232 Winter 2009 term. The student will respond to five questions based on in vivo or in vitro, MI or TI biologic effects, application of sonographic image quality related to instrumentation, and corrective instrumentation for pathology. Performance criteria table 5.  #2 Direct: Administer a laboratory practical in DMS 253 (component of DMS 232 and DMS 224), Winter 2009 to include sonographic instrumentation and image quality. Performance criteria will be found in Table 6  #3 Indirect: Administer personal survey regarding the student's assessment of sonographic biologic effects, sonographic instrumentation and instrumentation change mechanisms related to pathology. Performance criteria will be found in Table 7

**Table B2, 2008-2009 DMS Assessment Cycle**

**Assessment time map combining Institutional Student Learning Outcomes and Programmatic Student Learning Outcomes is found in Table B3.**

ISLO with PSLO Coordinating Assessment Cycle

Institutional Student Learning Outcomes	Programmatic Student Learning Outcomes	2008-2009	2009-2010	2010-2011
<b>1. Communication (oral, written, visual)</b>	1. The student will demonstrate effective oral, visual, and written communication skills			X
<b>2. Team and group work</b>	2. The student will demonstrate the ability to work effectively in teams		X	
<b>3. Professionalism and ethical practice</b>	3. The student will demonstrate an ability to provide basic patient care and comfort		X	
	4. The student will demonstrate knowledge and understanding of human gross and sectional anatomy relative to normal and abnormal sonographic imaging.	X		
<b>4. Critical Thinking and Problem Solving</b>	5. The student will demonstrate knowledge and understanding of human physiology, pathology and pathophysiology (Extern Case Study)			X
<b>5. Lifelong and independent learning)</b>	8. The student will demonstrate appropriate ergonomic scanning applications			X
6. Mathematical Knowledge, skills and application: NA to DMS in 2008-09 assessment period	6. The student will demonstrate knowledge and understanding of ultrasound physical principles and instrumentation.	X		
	6. <u>Reassessment</u> of specific ultrasound physics principles related to intensity reflection coefficient.	X		
7. Scientific knowledge and skills in scientific reasoning: NA to DMS in 2008-09 assessment period	7. The student will demonstrate knowledge of sonographic biological effects, proper application of sonographic instrumentation relative to imaging and film quality	X		
<b>8. Global perspectives and Cultural diversity</b>	9. The student will demonstrate an understanding of diverse cultural and humanistic traditions in the global society		X	

**Table B3, three year assessment cycle for DMS SLOs and PSLOs**

**The following are to be placed in the department files:**

SLO #4 Direct Assessment #2 Laboratory

Performance Criteria	70-79%	80-89%	90-100%	Total	Results
Correctly identifies specific gross human anatomy and surrounding structures in sagittal section	2	2	23	27	92%
Correctly identifies specific gross human anatomy and surrounding structures in transverse &/or coronal section(s)	1	4	22	27	96%
Correctly identifies and centers anatomic and relative sonographic landmarks	1	1	25	27	96%
Correctly identifies and corrects for detrimental artifacts potentially related to possible pathology	0	5	22	27	100%

Reassessment documentation for SLO #7

DMS 255 Unit three test on Blackboard

	Question	%	Question	%	Question	%	Question	%	Total
In Vivo	27	100	29	96	31	82	49	96	93.50%
In Vitro	34	100	39	100	40	100	41	100	100%
MI	36	100	43	100	44	100	47	100	100%
TI	35	100	37	100	38	100	46	92	98%