Oregon Institute of Technology
Medical Imaging Technology Department
Echocardiography Program Assessment
2014-2015

I. Introduction

Oregon Tech's Bachelor of Science in Echocardiography degree is one of only a few B.S. Degree programs in echocardiography in the United States. Oregon Tech will provide didactic instruction, clinical observations, and leadership and personal training, including basic and advanced training in imaging skills needed to properly perform the duties of a cardiac sonographer. Students are required to complete an 11-month externship at specifically chosen echocardiography laboratories. Externship will provide the hands-on training and patient load requirements necessary to meet the prerequisite requirements of the certifying board agency, the American Registry of Diagnostic Medical Sonographers (ARDMS), to be able to sit for the registry exam in adult echocardiography. During the 2013-14 externship year, one student had the opportunity to complete a directed clinical externship in pediatric echocardiography, and was qualified to sit for both the ARDMS adult and pediatric echocardiography registry exams.

The first Oregon Tech cohort for Echocardiography began fall 2008, with 14 students, and additional cohorts of 17 students in the fall of 2009, 20 students in the fall of 2010, 20 students in the fall of 2011, 24 admitted fall 2012, 20 admitted fall 2013, and 20 admitted fall 2014. June selections for fall 2015 MIT enrollment in Echocardiography will add the latest cohort of 20 students.

From the beginning of the program in fall 2008 to the end of spring term 2015, retention rate in the Echocardiography program is 92% (123 of the 134 students starting the Echocardiography program since inception).

Post 2015 graduation, total current enrollment is 58 students, including those anticipated as being accepted for fall 2015 entry into the Echocardiography Program. All graduates who are known to have applied for registry exams through either ARDMS or CCI have passed the Adult Echocardiography Registry, several have additionally passed and become registered in Pediatric Echocardiography, and Vascular Ultrasound. 99% of graduates (through the 2014 graduates) have worked or are working as cardiac sonographers, either per diem or in scheduled positions. Annual salaries reported varied from $25,000 to $84,000.

One of the major goals of the Echocardiography program (along with Diagnostic Medical Sonography, and Vascular Technology) has been to seek JRC-DMS/CAAHEP Programmatic Accreditation. The JRC-DMS self-study was submitted fall 2014, the JRC-DMS site visit occurred May 2015, and finalized submission of documentation for the accreditation process will be completed by the end of June 2015.

II. Program Purpose, Educational Objectives, and Student Learning Outcomes

The Echocardiography faculty agreed to adopt the student learning outcomes as suggested by the Joint Review Committee on Education in Diagnostic Medical Sonography (JRCDMS).

Echocardiography Program Purpose

The Oregon Tech Bachelor of Science program in Echocardiography provides students with the knowledge, clinical skills, values and behaviors to become competent cardiac sonographers.

Minimum Expectations: The program will meet the following goal, defining minimum expectations:

"To prepare competent entry-level adult cardiac sonographers in the cognitive (knowledge), psychomotor (skills), and affective (behavior) learning domains"

Echocardiography Program Educational Objectives

1. The program prepares students to utilize diagnostic techniques, sound judgment and good decision making to provide patient services.
2. The program communicates the importance of becoming credentialed in the profession of echocardiography.
3. The program prepares students who think critically, communicate effectively and exemplify professional ethics.
4. The program conveys the importance of becoming life-long learners and responsible citizens.

Expected Program Student Learning Outcomes

Graduates from this program will be able to:

1. Demonstrate the ability to communicate effectively in oral, written and visual forms.
2. Demonstrate the ability to work effectively in teams.
3. Demonstrate an ability to provide basic patient care and comfort.
4. Demonstrate professional judgment, discretion, and ethics.
5. Demonstrate knowledge and understanding of human gross anatomy, sectional anatomy, and normal and abnormal cardiovascular anatomy.
6. Demonstrate knowledge and understanding of cardiovascular physiology, pathology, and pathophysiology.
7. Demonstrate knowledge and understanding of cardiovascular physical principles and instrumentation.
8. Demonstrate knowledge and understanding of clinical echocardiographic diagnostic procedures and testing.
9. Demonstrate an understanding of diverse cultural and humanistic traditions in the global society.

Additional Student Learning Opportunities, and Programmatic Input

Students have been encouraged to attend meetings sponsored by northwest regional chapter of the American Society of Echocardiography (the Willamette Valley Society of Echocardiography - WVSE) held quarterly in Portland, and try to attend other regional society conferences held near their externship sites throughout the year.

Clinical Instructor input was accessed through late 2014 conference calls, and discussions covered the logistics of student documentation and verbal evaluation of the Trajecsys externship reporting system, areas of didactic concern, modifications to the current externship Competencies, and overall success of the program. Modifications will be significantly directed towards an update of the Competency Evaluations used on externship, better reflecting current practice models, and towards elimination many of the scoring areas that more properly fit within the Echocardiography Professional Evaluation.

The program Advisory Board/Committee met via teleconference fall 2013. Results and input from the discussions are available as needed. The program's Medical Director was frequently updated on the progress of the program's development, provided input as needed, and he visited campus and gave lectures to the junior and sophomore classes spring 2014. His overview of the program was a part of the JRC-DMS accreditation site visit, May 2015.

Much of the externship assessment material has been incorporate within the Trajecsys reporting system, and full details of all externship scoring is available on-line as needed.

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

The faculty also confirmed the assessment cycle planned, as listed in Table 1 below.

Echocardiography Degree Student Learning Outcomes Assessment Schedule	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
1. The student will demonstrate the ability to communicate effectively in oral, written and visual forms.			X(1)			X(1)	
2. The student will demonstrate the ability to work effectively in teams.			X(4)			X(4)	
3. The student will demonstrate an ability to provide basic patient care and comfort.	X			X			X
4. The student will employ professional judgment and discretion, including ethics.		X(3)			X(3)		
5. The student will demonstrate knowledge and understanding of human gross anatomy sectional anatomy and normal and abnormal cardiovascular anatomy.			X			X	
6. The student will demonstrate knowledge and understanding of cardiovascular physiology, pathology, and pathophysiology.	X			X(2)			X(2)
7. The student will demonstrate knowledge and understanding of cardiovascular physical principles and instrumentation.	X			X(5)			X(5)
8. The student will demonstrate knowledge and understanding of clinical echocardiography diagnostic procedures and testing		X			X		
9. The student will demonstrate an understanding of diverse cultural and humanistic traditions in the global society.		X(6)			X(6)		

Table #1 Echocardiography Degree Assessment Cycle – (number) indicates a SLO that incorporates proposed ESLO's. The pattern is subject to modification.

IV. Summary of 2014-15 Assessment Activities

A. Student Learning Outcome #3. The student will demonstrate an ability to provide basic patient care and comfort.

The mapping of this outcome in the Echocardiography courses can be found in Appendix A, Student Learning Outcome-Course Matrices Table A1.

Direct Assessment #1

The faculty assessed this outcome in ECHO 333 using a Blood borne Pathogens Quiz, and in ECHO 225 in the spring term Final Exam, using select questions. The faculty rated the proficiency of students using the performance criteria described in Table #2 below.

Performance Criteria	Assessment Methods	Measurement Scale	Minimum Acceptable Performance	Results
Knowledge of Universal Precautions	Echo 333 Blood borne pathogens quiz	% Scale per # of questions used	80% with 80% or higher	100% scored a passing grade
Ergonomics and Technologist/Patient Safety	Echo 225 Final Exam	% Scale per 3 questions used	80% with 2 or more correct	100% scored a passing grade
Knowledge of Communication Skills	Echo 225 Final Exam	% Scale per 3 questions used	80% with 2 or more correct	100% scored a passing grade
Infection Control	Echo 225 Final Exam	% Scale per 3 questions used	80% with 2 or more correct	94.4% scored a passing grade
Sonographer Professionalism and Ethics	Echo 225 Final Exam	% Scale per 3 questions used	80% with 2 or more correct	100% scored a passing grade

Table #2. SLO #3, Exam results - ECHO 333 fall 2014, ECHO 225 spring 2015

Students performed at the level expected of the sophomore echocardiography student, with acknowledgement that the quarter when this SLO is assessed is heavy on the more difficult core courses (physics and pathophysiology).

As a result of the data, students receive satisfactory introduction to SLO #3 in current course patterns. As state requirements change regarding standardized preparation of all students anticipating possible clinical placement in Oregon health care facilities, testing and documentation will be appropriately modified.

Direct Assessment #2

The faculty also assessed this outcome in ECHO 420 from the 2014-15 academic year using student competencies for echocardiography as assessed by industry. The faculty rated the proficiency of students using the performance criteria described in Table #3 below.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results -% with Target or higher
Knowledge of Universal Precautions	Student Competency Evaluation	1 – 100% Scale	80% with 80% or higher	100%
Anticipates/ responds to patient needs.	Student Competency Evaluation	1 – 100% Scale	80% with 80% or higher	100%
Knowledge of HIPAA Policies	Student Competency Evaluation	1 – 100% Scale	80% with 80% or higher	100%
Performs Within the Echocardiography Scope of Practice	Student Competency Evaluation	1 – 100% Scale	80% with 80% or higher	100%

Table #3. SLO #3, ECHO 420 extern competencies results

Students performed at a level of preparation expected of Oregon Tech graduates.

As a result of the data of the data, the current curricula will continue to be improved upon in the SLO subject areas. New standards of practice adopted by the professional societies (ASE, SDMS) will be incorporated into course material. Modifications to scanning documentation based on the JRC-DMS site visit evaluation will be incorporated with fall 2015 courses.

Indirect Assessment #1

The faculty assessed this outcome in ECHO 420 from the student 2014-15 exit surveys asking them to rate how well the OIT Echocardiography program and their extern site prepared them for this learning outcome #3. The students rated their proficiency using the performance criteria described in Table #4 below.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results -% with Target or higher
Student rating of how OIT prepared them for outcome #3.	Exit Survey	1 – 4 Scale	80% with a score of 3.0 or better	94%
Student rating of how their extern site prepared them for outcome #3.	Exit survey	1 – 4 Scale	80% with a score of 3.0 or better	100%

Table #4. SLO #3 ECHO 420 student self-assessment results

Students rated Oregon Tech as providing an adequate degree of initial preparation, though the graduate's level of clinical competence is obtained during the externship experience.

As a result of this assessment activity, there will be increased emphasis on incorporation of patient care subject matter within as many of the core courses as possible.

B. Student Learning Outcome #6: The student will demonstrate knowledge and understanding of cardiovascular physiology, pathology, and pathophysiology.

The Echocardiography faculty conducted an analysis of where this outcome is reflected in the curriculum. The mapping of this outcome in the Echocardiography courses can be found in Appendix A, Student Learning Outcome-Course Matrices Table A2.

Direct Assessment #1

The faculty assessed this outcome in ECHO 333 course during fall term using the final practical patient history and physical, the final practical imaging exam, and a final exam of pathology images. The faculty rated the proficiency of students using the performance criteria described in Table #5 below.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results - % with Target. or higher
Evaluates evidence from patient history and physical	Final Practical	% scale of correct	80% with 80% or higher	100%
Performs appropriate physiological tests	Final Practical	% scale per choices used	80% with 80% or higher	100%
Correctly identifies patient pathology	Pathology images final	0 – 100 %	75% with 75% or higher	100%
Extends/ Identifies protocols as required by findings	Final Practical	% scale per choices used	80% with 80% or higher	100%

Table #5. SLO #6 ECHO 333 results, fall 2014

Students performed at the required level of initial clinical experience, in the setting of the Oregon Tech Echocardiography Lab and with the imaging subjects that are available.

As a result of the data, the current imaging protocols will be continued, and imaging skills built up in the prior year's imaging course will be rapidly renewed as students return for fall classes. Imaging assignments for spring quarter will be continued, as there is no dedicated imaging class spring term, in the sophomore curriculum. There will also be increased emphasis on incorporation of patient care subject matter within as many of the core courses as possible.

Direct Assessment #2

The faculty also assessed this outcome in ECHO 420 from the 2014-15 academic year using student competencies for cardiac ultrasound as assessed by industry. The faculty rated the proficiency of students using the performance criteria described in Table #6 below.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results -% with Target or higher
Evaluates evidence from patient history and physical	Student Competency Evaluation	1 – 100% Scale	80% with a score of 80% or better	100%
Performs appropriate physiological tests	Student Competency Evaluation	1 – 100% Scale	80% with a score of 80% or better	100%
Correctly identifies patient pathology	Student Competency Evaluation	1 – 100% Scale	80% with a score of 80% or better	100%
Extends/ Identifies protocols as required by findings	Student Competency Evaluation	1 – 100% Scale	80% with a score of 80% or better	100%

Table #6. SLO #6 results for ECHO 420 student competencies.

Students performed at a high level of clinical performance, reflecting adequate levels of clinical preparation during the on-campus sophomore and junior years.

As a result of the data, increased use of case studies will be emphasized to increase the confidence needed for students to grow in the areas of critical thinking, and clinical application of didactic knowledge.

Indirect Assessment #1

The faculty assessed this outcome in EHCO 420 from the student 2014-15 exit surveys asking them to rate how well the OIT Echocardiography program and their extern site prepared them for this learning outcome #6. The student rated their proficiency using the performance criteria described in Table #7 below.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results -% with Target or higher
Student rating of how OIT prepared them for outcome #6	2014-15 Extern Exit Survey	1 – 4 Scale	80% with a score of 3.0 or better	100%
Student rating of how their extern site prepared them for outcome #6.	2014-15 Extern Exit Survey	1 – 4 Scale	80% with a score of 3.0 or better	94%

Table #7. SLO #6 results for ECHO 420 student self-assessment

Students had rated their training as providing satisfactory or better preparation for understanding cardiovascular physiology, pathology, and pathophysiology. The slightly lower score from the clinical externship area possibly reflects the emphasis on performance, rather than continued didactic preparation, which exists in the clinical environment.

As a result of the data, there will be discussions with clinical site supervisors on methods to increase exposure to image interpretation by sitting with the reading physicians, and an increased emphasis on mentoring on the part of the imaging lab staff.

C. Student Learning Outcome #7: The student will demonstrate knowledge of cardiovascular physical principles and instrumentation.

The Echocardiography faculty conducted an analysis of where this outcome is reflected in the curriculum. The mapping of this outcome in the Echocardiography courses can be found in Appendix A, Student Learning Outcome-Course Matrices Table A3.

Direct Assessment #1

The faculty assessed this outcome in MIT 231 course during winter term using final exam questions with sophomore echocardiography students. The faculty rated the proficiency of students using the performance criteria described in Table #8 below.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results -% with Target or higher
Demonstrate understanding of the nature of sound waves	Final Examination Questions	% scale of 3 questions used	75% with 2 or more questions correct	94%
Interpret interaction of ultrasound with various media	Final Examination Questions	% scale of 4 questions used	75% with 3 or more questions correct	94%
Identify component function of the transducer	Final Examination Questions	% scale of 4 questions used	75% with 3 or more questions correct	78%
Apply knowledge of hemodynamic principles	Final Examination Questions	% scale of 3 questions used	75% with 2 or more questions correct	Data not provided by instructor
Apply physical principles to optimize ultrasound images	Final Examination Questionss	% scale of 3 questions used	75% with 2 or more questions correct	100%

Table #8. SLO #7 results for MIT 231 final exam questions, winter 2015

Students performed at the anticipated level of students in the initial core echocardiography class. While the data was not available for the hemodynamic principles assessment question, it is anticipated that student were at the acceptable level of performance, as the subject area was taught in conjunction with the areas that were provided with a score.

The best possible result would be a higher outcome in the area with the 78% assessment outcome. Evaluation of that subject area will be monitored.

Direct Assessment #2

The faculty also assessed this outcome in ECHO 420 from the 2014-15 senior extern year, using cardiac scanning competencies where this outcome is assessed by industry. The faculty rated the proficiency of students using the performance criteria described in Table #9 below.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results -% with Target or higher
Selects appropriate technique(s) for examination	Student Competency Evaluation	1 – 100% Scale	80% with a score of 80% or better	100%
Adjusts instrument controls to optimize image quality.	Student Competency Evaluation .	1 – 100% Scale	80% with a score of 80% or better	100%
Takes appropriate measurements	Student Competency Evaluation	1 – 100% Scale	80% with a score of 80% or better	100%
Recognizes and compensates for acoustic artifacts	Student Competency Evaluation	1 – 100% Scale	80% with a score of 80% or better	100%
Minimizes patient exposure to acoustic energy.	Student Competency Evaluation	1 – 100% Scale	80% with a score of 80% or better	100%

Table #9. SLO #7 results for ECHO 420 student competencies

Students performed at an extremely high level of proficiency, reflecting the value of the full-time clinical externship experience.

This is the best possible result, and the quality of the clinical sites that are utilized will continue to be monitored.

Indirect Assessment #1

The faculty assessed this outcome in ECHO 420 from the student 2014-15 exit surveys asking them to rate how well the OIT Echocardiography program and their extern site prepared them for this learning outcome #7. The students rated their proficiency using the performance criteria described in Table #10 below.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results -% with Target Av. or higher
Student rating of how OIT prepared them for outcome #7.	Exit Survey	% scale per category used	80% with a score of 3.0 or better	(no effective return on question)
Student rating of how their extern site prepared them for outcome #7.	Exit survey	% scale per category used	80% with a score of 3.0 or better	(no effective return on question)

Table #10. SLO #7 results for ECHO 420 student self-assessment

Only one of total returned surveys answered this assessment question. It should be noted that the majority of the students, if not all, have already passed the ARDMS Sonography Principles and Instrumentation exam required for taking the Adult Echocardiography Registry Exam.

V. Evidence of Student Learning

During the 2014-15 academic year, the program faculty formally assessed the student learning outcomes summarized below. Additional details on these assessment activities can be found in the attached assessment report and in department records. The JRC-DMS Self-study also provides a thorough look at the total imaging program, and illustrates the degree of preparation and dedication that has been provided by not only the Echocardiography faculty, by the MIT Department as a whole.

Student Learning Outcome # 3: The student will demonstrate an ability to provide basic patient care and comfort.

Strengths: Adequate preparation for the externship experience.

Areas needing improvement: continued incorporation of patient care standards within all core program courses.

Plans for improvement: Focus on newest Scope of Practice documentation, continued incorporation of current realities within the profession regarding patient safety, HIPAA regulations, and increased emphasis on Appropriateness Guidelines.

Student Learning Outcome #6: The student will demonstrate knowledge and understanding of vascular physiology, pathology, and pathophysiology.

Strengths: Strong didactic on-campus preparation.

Areas needing improvement: Increased mentoring upon clinical externship.

Plans for improvement: Oregon Tech Echocardiography faculty/Clinical Instructor tele-conference focusing on increased mentoring on the part of clinical site staff, and physicians. Increased emphasis on attendance at WVSE quarterly meetings.

Student Learning Outcome #7: The student will demonstrate knowledge of vascular physical principles and instrumentation.

Strengths: Students pass the ARDMS SPI Registry Exam, and demonstrate a high level of clinical application of sonographic principles during the externship year.

Areas needing improvement: Newer equipment for the imaging lab.

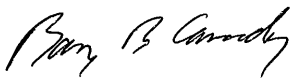
Plans for improvement: Starting search for industry partnerships as current equipment contracts approach end of service. Once new partnership has been obtained, utilize applications specialists to learn advances reflected in the ultrasound machines that will be used.

VI. Changes Resulting from Assessment.

This assessment has been as much a reflection of preparation for the JRC-DMS/CAAHEP programmatic accreditation process, as it is a statement of the program in its present state. The levels of accomplishment that have been demonstrated to the JRC-DMS site visit team are a reflection of the over-all strength and integrity of the program, and will continued to be built upon.

The greatest area of growth will need to be in the partnership with, and development of the staff in the current clinical affiliate institutions, along with recruitment of new affiliate sites as the Oregon Tech program gains national recognition.

Increased growth in the amount of didactic material (or enhancement of current material) will be required as advances in the field of cardiac ultrasound are accepted into clinical practice.



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Appendix A
Student Learning Outcome-Course Matrices

SLO #3: The student will demonstrate an ability to provide basic patient care and comfort.

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 the performance on the SLO.

I = Introduced; R = Reinforced; E = Emphasized

	Sophomore			Junior			Senior		
Fall	BIO 220	Cardio Phys		BUS 317	HlthCare Mgmt		ECHO 420	Extern	E
	ECHO 231	Echo I	IE	ECHO 333	Echo III	R			
	PHY 217	Physics of MI		ECHO 321	TEE & Stress				
	WRI 227	Tech Writing		SPE 321	Small Group Comm				
Win	ECHO 232	Echo II		BUS 316	TQM		ECHO 420	Extern	E
	BIO 346	Patho I		CHE 210	Clinical Pharm				
	MIT 231	Sono principles I		ECHO 376	Survey of Vas Tech	R			
	Soc Sci	Elective		ECHO 325	Pediatric Echo				
				Hum	Elective				
Spr	ECHO 225	Pt Mgmt	IE	ECHO 385	Lab Mgmt		ECHO 420	Extern	E

	ECHO 320	Cardio Methods		ECHO 334	Echo IV				
	ECHO 332	Invasive Cardio		ECHO 388	Extern Orient	R			
	BIO 347	Patho II		Comm	Elective				
	MIT 232	Sono principles II		Hum	Elective				

Table A1. Student Learning Outcome #3-Course Matrix
**Subject to change as courses are designed and developed.

Appendix A
Student Learning Outcome-Course Matrices

SLO #6: The student will demonstrate knowledge and understanding of cardiovascular physiology, pathology, and pathophysiology.

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 the performance on the SLO.

I = Introduced; R = Reinforced; E = Emphasized

	Sophomore			Junior			Senior		
Fall	BIO 220	Cardio Phys	IE	BUS 317	HlthCare Mgmt		ECHO 420	Extern	E
	ECHO 231	Echo I		ECHO 333	Echo III	R			
	PHY 217	Physics of MI		ECHO 321	TEE & Stress	R			
	WRI 227	Tech Writing		SPE 321	Small Group Comm				
Win	ECHO 232	Echo II	IE	BUS 316	TQM		ECHO 420	Extern	E
	BIO 346	Patho I	IE	CHE 210	Clinical Pharm				
	MIT 231	Sono Principles I		ECHO 376	Survey of Vas Tech				
	Soc Sci	Elective		ECHO 325	Pediatric Echo	R			
				Hum	Elective				
Spr	ECHO 225	Pt Mgmt		ECHO 385	Lab Mgmt		ECHO 420	Extern	E
	ECHO 320	Cardio Methods	IE	ECHO 334	Echo IV	RE			
	ECHO 332	Invasive Cardio		ECHO 388	Extern Orient				
	BIO 347	Patho II	R	Comm	Elective				
	MIT 232	Sono principlesII		Hum	Elective				

Table A2. Student Learning Outcome #6-Course Matrix
**Subject to change as courses are designed and developed.

Appendix A
Student Learning Outcome-Course Matrices

SLO #7: The student will demonstrate knowledge and understanding of cardiovascular physical principles and instrumentation.

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 the performance on the SLO.

I = Introduced; R = Reinforced; E = Emphasized

	Sophomore			Junior			Senior		
Fall	BIO 220	Cardio Phys		BUS 317	HlthCare Mgmt		ECHO 420	Extern	E
	ECHO 231	Echo I		ECHO 333	Echo III	R			
	PHY 217	Physics of MI		ECHO 321	TEE & Stress				
	WRI 227	Tech Writing		SPE 321	Small Group Comm				
Win	ECHO 232	Echo II		BUS 316	TQM		ECHO 420	Extern	E
	BIO 346	Patho I		CHE 210	Clinical Pharm				
	MIT 231	Sono principles I	IE	ECHO 376	Survey of Vas Tech				
	Soc Sci	Elective		ECHO 325	Pediatric Echo				
				Hum	Elective				
Spr	ECHO 225	Pt Mgmt		ECHO 385	Lab Mgmt		ECHO 420	Extern	E
	ECHO 320	Cardio Methods		ECHO 334	Echo IV	R			
	ECHO 332	Invasive Cardio		ECHO 388	Extern Orient				
	BIO 347	Patho II	IR	Comm	Elective				
	MIT 232	Sono principles II	IE	Hum	Elective				

Table A3. Student Learning Outcome #7-Course Matrix
**Subject to change as courses are designed and developed.