Oregon Institute of Technology
Medical Imaging Technology Department
Echocardiography Program Assessment
2013-2014

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, and 20 admitted fall 2013. Selection for fall 2014 MIT enrollment also included an echocardiography cohort of 20 students.

From the beginning of the program in fall 2008 to the end of spring term 2014, retention rate in the Echocardiography program is 90% (for the fall 2012 cohort, 24 students had been admitted, but 2 elected to not begin fall classes, so are not included in the over-all retention rate). 11 of the initial 2008 cohort of 14 students completed the initial externship, and became the first graduating class in the Echocardiography program spring 2011. The class of 2012 graduated 15 of the 17 students admitted, the class of 2013 graduated 20 of 21 admitted students (plus 1 student completing the program *in absentia*), the class of 2014 graduated 19 of 20 admitted students. 17 of 22 on-campus students from fall 2012 were on their senior year of externship, and 20 of 21 juniors were continuing their on-campus didactic education, for a total of 104 continuing/graduated students of the 115 students starting the Echocardiography program since inception.

After graduation 2014, 62 of 67 students entering between 2008 and 2011will have graduated. Total current enrollment is 57 students, including those accepted for fall 2014 entry into the Echocardiography Program. All 2011, 2012, and 2013 graduates who have applied for registry exams through either ARDMS or CCI have passed. 91% of 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.

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

The Echocardiography faculty agreed to adopt the student learning outcomes as suggested by a programmatic accrediting body, 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.

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 American Society of Echocardiography (ASE) conferences to be held in Portland summer 2014, and to regional society 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 visited campus and gave lectures to the junior and sophomore classes spring 2014.

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	2011-12	2012-13	2013-14
1. The student will demonstrate the ability to communicate effectively in oral, written and visual forms.			X
2. The student will demonstrate the ability to work effectively in teams.		X	
3. The student will demonstrate an ability to provide basic patient care and comfort.	X		
4. The student will employ professional judgment and discretion, including ethics.		X	
5. The student will demonstrate knowledge and understanding of human gross anatomy sectional anatomy and normal and abnormal cardiovascular anatomy.			X
6. The student will demonstrate knowledge and understanding of cardiovascular physiology, pathology, and pathophysiology.	X		
7. The student will demonstrate knowledge and understanding of cardiovascular physical principles and instrumentation.	X		
8. The student will demonstrate knowledge and understanding of clinical echocardiography diagnostic procedures and testing		X	
9. The student will demonstrate an understanding of diverse cultural and humanistic traditions in the global society.			X

Table #1 Echocardiography Degree Assessment Cycle

IV. Summary of 2013-14 Assessment Activities

A. Student Learning Outcome #1: The student will demonstrate the ability to communicate effectively in oral, written and visual forms.

Written Communication
The performance criteria for written communicate are:

1. Writing is clear, focused and understandable.
2. Order & structure are clear with satisfying introduction and conclusion.
3. Document is well supported.
4. Voice and wording are appropriate and compelling.
5. Standard writing conventions are used effectively.

Oral Communication
The performance criteria for oral communication are:

1. Content is supported, informative and persuasive.
2. Presentation is well organized with smooth transitions.
3. Topic is well understood and conveyed with enthusiasm.
4. Delivery is effective and poised.

Direct Assessment #1
The faculty assessed this outcome in ECHO 321 in fall term using a Journal Article Review/Presentation Grading Rubric for the writing assignment and oral presentation grading. The faculty rated the proficiency of 17 junior students using the performance criteria described in Table 2 below.

Performance Criteria	Assessment Methods	Measurement Scale	Minimum Acceptable Performance	Results
Proper format	Grading Rubric	0-10 scale per rubric proficiency criteria	90% with 8 or higher	88% scored 8 or higher
Adequate coverage of material	Grading Rubric	0-10 scale per rubric proficiency criteria	90% with 8 or higher	100% scored 8 or higher
Utilization of Proper Grammatical Style	Grading Rubric	0-5 scale per rubric proficiency criteria	90% with 4 or higher	100% scored 5
Oral presentation – demonstration of understanding, professional terminology utilized, effective delivery	Grading Rubric	0-24 scale per rubric proficiency criteria	90% with 19 or higher	100% scored 19 or higher

Table #2 Assessment Results for SLO #1 written and oral communication, fall 2013

Strengths: 100% of students performed at minimum acceptable levels for the following performance criteria:

- Writing is clear, focused and understandable, with proper grammatical conventions followed in the professional literature.
- Journal article is adequately presented.

- Oral presentations adequately communicated a level of understanding of the material presented.

Weaknesses: Minimum acceptable performance was not obtained for the following performance criteria: utilization of proper format. Two students did not use the provided format.

Action: As a result of the data, improvement is needed in appropriate utilization of support, style and conventions in written communication when presenting reviews of professional Journal Articles. In 2 cases, standard writing conventions were particularly deficient, even though examples of proper style were provided to the class. Proper style will be emphasized more forcefully in future classes requiring article reviews.

Direct Assessment #2
The faculty assessed the *written communication* outcome in ECHO 420 fall term 2013 using the Echocardiography Externship fall term case study grading rubric. The faculty rated the proficiency of 20 senior students using the performance criteria described in Table 3 below.

Performance Criteria	Assessment Methods	Measurement Scale	Minimum Acceptable Performance	Results
Case Study Content	Grading Rubric	1-10 scale per rubric proficiency criteria	90% with 7.0 or higher	100%
Organization (overall presentation)	Grading Rubric	1-15 scale per rubric proficiency criteria	90% with 12.0 or higher	100%
Style (Discussion)	Grading Rubric	1-10 scale per rubric proficiency criteria	90% with 7.0 or higher	100%
Delivery (grammar, spelling, terminology)	Grading Rubric	1-10 scale per rubric proficiency criteria	90% with 7.0 or higher	95%
Visual aids	Grading Rubric	1-10 scale per rubric proficiency criteria	90% with 7.0 or higher	100%

Table #3 Assessment Results for SLO #1 written communication, fall 2013

Strengths: Minimum acceptable performance was achieved for all performance criteria.
- Content is supported, informative & persuasive
- Well-designed visuals are utilized & integrated in to speech.
- Presentation is well organized with smooth transitions.
- Topic is well understood & conveyed with enthusiasm.
- Delivery is effective, and at a level expected of students in the clinical setting.

Weaknesses: While minimum levels were reached, review of case study presentations, and the need for utilization of proper grammar, spelling, and terminology will be emphasized during the Externship Preparation classes in spring term each year. Example of adequate case studies will be made available for review.

Direct Assessment #3
The faculty also reviewed Clinical Instructors assessment of this outcome at Externship sites fall term 2013 using the Student Competency Evaluations available to sites via the Trajecsys reporting system. The Clinical Instructors rated the proficiency of 20 senior students using the performance criteria described in Table 4 below.

Performance Criteria	Assessment Methods	Measurement Scale	Minimum Acceptable Performance	Results
Maintains clinical records	Student Competency Evaluation	0-100%	90% with a score of 80 or better	95% scored 80 or better
Appropriate oral & written summaries to interpreting physician	Student Competency Evaluation	0-100%	90% with a score of 80 or better	95% scored 80 or better
Employs medical terminology, abbreviations, symbols & terms appropriately	Student Competency Evaluation	0-100%	90% with a score of 80 or better	95% scored 80 or better
Educates patients regarding echo procedure	Student Competency Evaluation	0-100%	90% with a score of 80 or better	95% scored 80 or better

Table #4 Student Competency Evaluation Results for SLO #1, fall 2013

Strengths: Minimum acceptable performance was achieved for all the performance criteria specified.

Weaknesses: One student scored below the level of acceptable performance, and was counseled with the intention of improving to acceptable performance.

As a result of the data, additional mock study evaluation and reporting will be introduced in the ECHO 321, 333, and 334 classes. More thorough utilization of the electronic report package in the CoreSound PACS will be instituted.

Indirect Assessment #1
This outcome was assessed in exit surveys evaluating the Echocardiography Program, completed by both senior students and clinical sites, and by a Clinical Site Evaluation completed by senior students nearing or upon completion of their clinical externship in ECHO 420, spring term 2014. 14 Externship sites participated in the program evaluation, 16 students completed Clinical Site Evaluations and 15 completed Program Evaluations. The criteria and results are provided in Table 5 below.

Evaluation scale: (1) Poor (2) Satisfactory (3) Good (4) Excellent (n/a) Not applicable

Performance Criteria	**Assessment Methods**	**Measurement Scale**	**Minimum Acceptable Performance**	**Results**
The student will demonstrate the ability to communicate effectively in oral, written, and visual forms	Student Program Evaluation	1-4 evaluation scale	90% with 3 or higher	100% rated the program 3 or higher
The student will demonstrate the ability to communicate effectively in oral, written, and visual forms	Student Clinical Site Evaluation	1-4 evaluation scale	90% with 3 or higher	100% rated the clinical site 3 or higher
The student will demonstrate the ability to communicate effectively in oral, written, and visual forms	Clinical Site Program Evaluation	1-4 evaluation scale	90% with 3 or higher	93% rated the program 3 or higher

Table #5 Exit survey results for SLO #1, spring 2014

Strengths: Both the Echocardiography Program and clinical sites were rated as meeting acceptable levels of performance in providing students with an educational setting that allowed the students to demonstrate the ability to communicate effectively.

Weaknesses: While no significant weakness was identified, continuing emphasis on, and expansion on opportunities to practice and improve on communication skills will be provided in core echocardiography classes.

B. Student Learning Outcome #5: The student will demonstrate knowledge and understanding of human gross anatomy, sectional anatomy, and normal and abnormal cardiovascular anatomy.

The performance criteria for this outcome are:

1. Student is able to associate anatomical landmarks in the region of interest with cardiac anatomy.
2. Student is able to accurately identify cross sectional cardiac anatomy in ultrasound images as well as in radiologic, CT and MRI images for quality assurance.
3. Student recognizes the sonographic appearance of normal and abnormal cardiac anatomy.

Direct Assessment #1

The faculty assessed this outcome through Competency Evaluations completed by Clinical Instructors on 19 senior students during ECHO 420 externship winter term 2014. The proficiency of students was rated using the performance criteria described in Table 6 below.

Performance Criteria	**Assessment Methods**	**Measure Scale**	**Minimum Acceptable Performance**	**Results -% with Target. or higher**
Associates anatomical landmarks with cardiovascular anatomy	Student Competency Evaluation	0-100%	90% with a score of 80 or better	100%
Identifies cross sectional anatomy for QA	Student Competency Evaluation	0-100%	90% with a score of 80 or better	100%
Recognizes normal and cardiovascular anatomy	Student Competency Evaluation	0-100%	90% with a score of 80 or better	100%

Table #6 Assessment Results for SLO #5, winter 2014

Strengths: Students performed at or above the minimum acceptable level of performance.

Weaknesses: Cross sectional anatomy for QA is infrequently used within many working echocardiography labs, and will be reassessed as to whether it needs continued inclusion in this SLO.

As a result of the data, the faculty in the Echo Program decided to continue assessing SLO#5 through externship Competency Evaluations. The evaluation format will be revised over the 2014-2015 externship year, to better reflect industry input on competency items more pertinent to cardiovascular ultrasound imaging.

Indirect Assessment #1
This outcome was also assessed in exit surveys evaluating the Echocardiography Program, completed by both senior students and clinical sites, and by a Clinical Site Evaluation completed by senior students nearing or upon completion of their clinical externship in ECHO 420, spring term 2014. 14 Externship sites participated in the program evaluation, 16 students completed Clinical Site Evaluations and 15 completed Program Evaluations. The criteria and results are provided in Table 5 below.

Evaluation scale: (1) Poor (2) Satisfactory (3) Good (4) Excellent (n/a) Not applicable

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results -% with Target or higher
Associates anatomical landmarks with cardiac anatomy	Student Program Evaluation	1-4 evaluation scale	90% with a score of 3 or better	100% rated the program 3 or higher
Identifies cross sectional anatomy for QA	Student Clinical Site Evaluation	1-4 evaluation scale	90% with a score of 3 or better	94% rated the clinical site 3 or higher (1 reviewer rated the item n/a)
Recognizes normal and abnormal cardiac anatomy	Clinical Site Program Evaluation	1-4 evaluation scale	90% with a score of 3 or better	93% rated the program 3 or higher

Table #7 Exit survey results for SLO #5, spring 2014

Strengths: Both the Echocardiography Program and clinical sites were rated as meeting acceptable levels of performance in providing students with an educational setting promoting the acquisition of clinical knowledge and understanding of human gross anatomy, sectional anatomy, and normal and abnormal cardiovascular anatomy.

Weaknesses: While no significant weakness was identified, continuing emphasis on, and expansion on opportunities to practice and improve on imaging and interpretation skills will be provided in core echocardiography classes.

C. Student Learning Outcome #9: The student will demonstrate an understanding of diverse cultural and humanistic traditions in the global society.

Direct Assessment #1

This outcome was assessed by faculty spring term 2014. 17 junior students in the ECHO 388 Externship Preparation class were lectured on international prevalence, concerns, and management of cardiovascular disease. Particular emphasis was made on international and cultural variability in access to cardiovascular testing. The emergence of outreach services to underdeveloped countries and regions was introduced as part of a comprehensive solution to the discrepancies seen between countries on a global scale. A quiz was administered to assess retention of presented information. Proficiency is described in Table 8 below.

The mapping of this outcome in the Echocardiography curriculum can be found in Appendix A, Student Learning Outcome-Course Matrices Table A3.

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results -% with Target or higher
Reflects understanding of global distribution of cardiovascular disease (CVD)	Echo 388 Awareness Quiz Questions 3,5,6,7	1-4 evaluation scale	90% with a score of 3 or better	100% scored 3 or higher
Reflects understanding of cultural distribution and discrepancies of CVD	Echo 388 Awareness Quiz Questions 2,4,8	1-3 evaluation scale	90% with a score of 3	94% scored 3
Reflects understanding of testing resources available globally	Echo 388 Awareness Quiz Questions 1,9,10	1-3 evaluation scale	90% with a score of 3	94% scored 3

Table #8 Testing results SLO #9, spring 2014

Strengths: Students reflected an understanding of cardiovascular disease and testing on a global scale, with variations due to cultural diversity and resources.

Weaknesses: While cultural diversity can be taught, the Oregon Tech student body does not reflect the wide diversity that students will encounter when going on clinical externship.

As a result of the data, additional presentations of both pathophysiology and imaging resources as viewed globally will be provided. In the Externship Preparation class spring term, students will be presented information on cultural differences that will be encountered on externship.

Indirect Assessment #1

This outcome was also assessed in exit surveys evaluating the Echocardiography Program, completed by both senior students and clinical sites, and by a Clinical Site Evaluation completed by senior students nearing or upon completion of their clinical externship in ECHO 420, spring term 2014. 14 externship sites participated in the program evaluation, 16 students completed Clinical Site Evaluations and 15 completed Program Evaluations. The criteria and results are provided in Table 5 below.

Evaluation scale: (1) Poor (2) Satisfactory (3) Good (4) Excellent (n/a) Not applicable

Performance Criteria	Assessment Methods	Measure Scale	Minimum Acceptable Performance	Results -% with Target or higher
The student will demonstrate an understanding of diverse cultural and humanistic traditions in the global society	Student Program Evaluation	1-4 evaluation scale	90% with a score of 3 or better	93% rated the program 3 or higher
The student will demonstrate an understanding of diverse cultural and humanistic traditions in the global society	Student Clinical Site Evaluation	1-4 evaluation scale	90% with a score of 3 or better	94% rated the clinical site 3 or higher
The student will demonstrate an understanding of diverse cultural and humanistic traditions in the global society	Clinical Site Program Evaluation	1-4 evaluation scale	90% with a score of 3 or better	92% rated the program 3 or higher (1 n/a)

Table #9 Exit survey results for SLO #9, spring 2014

Strengths: Externship provides many students with cultural diversity on a scale not experienced if the student originates from many of the smaller communities in the Northwest.

Weaknesses: Similar to those noted in SLO #9 Direct Assessment #1 above.

V. Evidence of Student Learning

During the 2013-2014 academic year, the program faculty formally assessed the student learning outcomes summarized below. Additional details on these assessment activities can be found in this assessment report and in department records.

Student Learning Outcome #1: The student will demonstrate the ability to communicate effectively in oral, written and visual forms.

Strengths: Student preparation and presentation of Case Studies when on clinical externship represents a high level of understanding and ability to communicate the pathophysiology and imaging intricacies encountered in the clinical setting.

Areas needing improvement: The echocardiography program has had few requirements for preparation and presentation of didactic material within the on-campus courses. The rubrics that have been utilized are not always of a structure that reflects the level of individual student participation in terms of group presentations, and when applied to individual papers or presentations, don't "push" the students to their maximum commitment.

Plans for improvement: Rubrics will be revised and updated for 2014-2015. Additional papers, and oral presentations of material will be implemented throughout the on-campus courses.

Student Learning Outcome #5: The student will demonstrate knowledge and understanding of human gross anatomy, sectional anatomy, and normal and abnormal cardiovascular anatomy.

Strengths: Clinical externship provides a wide range of opportunities to integrate didactic knowledge obtained on-campus, and apply the expanding knowledge base to the performance area – actually being responsible for obtaining the clinically relevant images.

Areas needing improvement: A narrow range of scanning subjects is available to students for scanning opportunities on-campus. A limited number of imaging clips are used for presentation during core echocardiography classes.

Plans for improvement: A wider range of on-campus imaging subjects, or a method of recruiting off-campus volunteers will be explored, as student subjects provide only a narrow cross section of body types and presenting anatomy/pathologies. Additional imaging examples will be incorporated into core echocardiography classes, and a cross reference file of images from existing full echo studies will be developed.

Student Learning Outcome #9: The student will demonstrate an understanding of diverse cultural and humanistic traditions in the global society.

Strengths: Clinical externship provides a introduction to many levels of society, and many cultures as students encounter a wide-diversity of patients in the clinical setting.

Weaknesses: The isolation of the Oregon Tech campus – geographical, cultural, and geopolitical – presents a challenge in terms of patient management and application of imaging with respect to cultural variation that will be encountered in the workforce.

Plans for improvement: Encourage recruitment of imaging volunteers from the entire spectrum of ethnicities and cultures that are present in the Oregon Tech community. Research professional literature and present information on challenges represented or seen in active echocardiography labs. Continue to highlight culture awareness throughout the core echo classes, with particular emphasis during the Externship Preparation class spring term of the junior year.

VI. Changes Resulting from Assessment.

1. The Echocardiography Program now utilizes an on-line externship reporting and documentation program – Trajecsys. Clinical Instructors enter Competency Evaluations and Echo Professional Evaluations electronically, providing ready access to the data needed for assessment preparation, and programmatic accreditation. Both students and externship staff have indicated enthusiasm in the move from paper-based documentation, to electronic reporting.

   A Clinical Instructor teleconference was held spring 2014, providing a discussion opportunity as to ways to improve the clinical externship Competencies and Professional Evaluations. Initial suggestions or examples of modifications to these documents – particularly Competencies – have been made available to the Clinical Instructors, and the program faculty encouraged submission of other documentation methods or forms that have been utilized at the clinical sites. The modifications to Competencies and to the Professional Evaluation will occur over the coming year, with implementation planned for 2015-2016.

2. The credit hours in the Externship Preparation class, held spring term prior to going on externship, was increased from 2 to 3 credit hours. The additional review and discussion of complete echocardiograms from working echocardiography labs was a valuable opportunity to see complete echo studies similar to what will be encountered upon externship. The additional imaging was planned to be instrumental in decreasing the time needed for students to work into imaging in the clinical setting upon starting externship. The results will be reviewed after the first 2 terms of the 2014-2015 externship year.

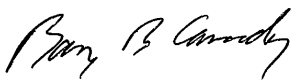
3. The current pattern in which SLO's are assessed and evaluated continues to make it difficult to compare year-to-year improvements in specific areas. Faculty will discuss ways to implement a tighter assessment schedule that will allow more frequent comparison of at least SLO's that reflect core knowledge and scanning competency.

   As was noted in the 2013-2014 Assessment Report, a second area where the current reporting structure could be modified is in the addition of tracking of student progress on externship within the externship year itself. This will be also be discussed by faculty.

4. In reviewing the assessment results over-all, assessment scores from student competencies and professional evaluations reflect a general trend towards improvement in the level of preparation by the program, and training/education on the part of the clinical externship sites themselves. It is noted through review of the exit surveys, that the clinical sites scored the assessments higher on average than did the students, reflecting confidence in the program and student preparation.

5. The Echocardiography Program, along with the Vascular Technology and Diagnostic Medical Sonography programs, started the self-documentation portion of preparations needed to apply for programmatic accreditation through JRC-DMS/CAAHEP. The evaluations needed, and that will be reviewed, will provide additional assessment data for the program.

   The self-study documentation of programmatic strengths and limitations is available if requested.



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Appendix A
Student Learning Outcome-Course Matrices

Student Learning Outcome #1: The student will demonstrate the ability to communicate effectively in oral, written and visual forms.

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	R	ECHO 420 (includes summer term)	Extern	R E
	ECHO 320	Cardio Methods		ECHO 333	Echo III	R			
	PHY 217	Physics of MI		ECHO 321	TEE & Stress	R			
	WRI 227	Tech Writing	I E	SPE 321	Small Group Comm	I E			
Win	ECHO 231	Echo I	R	BUS 316	TQM	R	ECHO 420	Extern	R E
	BIO 346	Patho I		CHE 210	Clinical Pharm				
	MIT 231	SPI I		ECHO 376	Survey of Vasc Testing	R			
	Soc Sci	Elective		ECHO 325	Pediatric Echo	R			
				Hum	Elective	Hum			
Spr	ECHO 225	Pt Mgmt	I E	ECHO 385	Lab Mgmt	R E	ECHO 420	Extern	R E
	ECHO 232	Echo II	R	ECHO 334	ECHO IV				
	ECHO 332	Invasive Cardio		ECHO 388	Extern Prep	R			
	BIO 347	Patho II		Comm	Elective	E			
	MIT 232	SPI II		Hum	Elective				

Table A1. Student Learning Outcome #1-Course Matrix
**Subject to change as courses are designed and developed.

Appendix A
Student Learning Outcome-Course Matrices

Student Learning Outcome #5: The student will demonstrate knowledge and understanding of human gross anatomy, sectional anatomy, and normal and abnormal cardiovascular anatomy.

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	I E	BUS 317	HlthCare Mgmt		ECHO 420 (includes summer term)	Extern	E R
	ECHO 320	Cardio Methods	R	ECHO 333	Echo III	E			
	PHY 217	Physics of MI		ECHO 321	TEE & Stress	E			
	WRI 227	Tech Writing		SPE 321	Small Group Comm				
Win	ECHO 231	Echo I	I E	BUS 316	TQM		ECHO 420	Extern	E R
	BIO 346	Patho I	R	CHE 210	Clinical Pharm				
	MIT 231	SPI I		ECHO 376	Survey of Vasc Testing	I E			
	Soc Sci	Elective		ECHO 325	Pediatric Echo	I E			
				Hum	Elective	Hum			
Spr	ECHO 225	Pt Mgmt		ECHO 385	Lab Mgmt		ECHO 420	Extern	E R
	ECHO 232	Echo II	E R	ECHO 334	ECHO IV	I E			
	ECHO 332	Invasive Cardio	E R	ECHO 388	Extern Prep				
	BIO 347	Patho II	R	Comm	Elective				
	MIT 232	SPI II		Hum	Elective				

Table A2. Student Learning Outcome #5-Course Matrix
**Subject to change as courses are designed and developed.

Student Learning Outcome-Course Matrices

Student Learning Outcome #9: The student will demonstrate an understanding of diverse cultural and humanistic traditions in the global society.

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	I E	ECHO 420 (includes summer term)	Extern	E R
	ECHO 320	Cardio Methods		ECHO 333	Echo III	R			
	PHY 217	Physics of MI		ECHO 321	TEE & Stress	E			
	WRI 227	Tech Writing		SPE 321	Small Group Comm	R			
Win	ECHO 231	Echo I	I E	BUS 316	TQM	E R	ECHO 420	Extern	E R
	BIO 346	Patho I	R	CHE 210	Clinical Pharm				
	MIT 231	SPI I		ECHO 376	Survey of Vasc Testing	R			
	Soc Sci	Elective		ECHO 325	Pediatric Echo	E R			
				Hum	Elective	R			
Spr	ECHO 225	Pt Mgmt	E R	ECHO 385	Lab Mgmt	E R	ECHO 420	Extern	E R
	ECHO 232	Echo II	E R	ECHO 334	ECHO IV	E R			
	ECHO 332	Invasive Cardio	R	ECHO 388	Extern Prep	E R			
	BIO 347	Patho II	R	Comm	Elective	R			
	MIT 232	SPI II		Hum	Elective	R			

Table A3. Student Learning Outcome #9-Course Matrix
**Subject to change as courses are designed and developed.