NAACLS Year 5 Interim Report
Medical Laboratory Sciences Program

WEBER STATE UNIVERSITY

2013/2014 to 2018/2019

Janice Thomas MEd; MT(ASCP)
Associate Professor and Program Director
Department of Medical Laboratory Sciences
Dr. Ezekiel R. Dumke College of Health Professions
Weber State University
3875 Stadium Way Dept 3905
Ogden, UT 84408
Email: janicethomas@weber.edu
Office: 801-626-8138

Matthew J. Nicholaou, DrPH, MT(ASCP)
Associate Professor and Chair
Department of Medical Laboratory Sciences
Dr. Ezekiel R. Dumke College of Health Professions
Weber State University
3875 Stadium Way, Dept. 3905
Ogden, UT 84408
Email: matthewnicholaou@weber.edu
Office: (801) 626-6101

Table of Contents

Year 5 Interim Report
Medical Laboratory Sciences
Weber State University

Program Overview

The Medical Laboratory Sciences program is located within the Dr. Ezekiel R. Dumke College of Health Professions at Weber State University (WSU). It provides undergraduate education in Medical Laboratory Sciences for students wishing to complete degrees that include the MLS Laboratory Professional (Track 1) Bachelor of Sciences Degree, MLS Pre-professional (Track II) Bachelor of Sciences Degree, MLS Associate of Applied Sciences Degree (MLT), and a Clinical Laboratory Assistant Certificate of completion. It also serves students seeking MLS courses for continuing education, personal interest, or certification examination preparation.

Curriculum:

Types of degrees and certificates offered:

- Associate of Applied Science (AAS) in MLS
- Bachelor of Science (BS) in MLS Track I
- Bachelor of Science (BS) in MLS Track II
- Clinical Laboratory Assistant (CLA) Certificate of Completion

Summary of last 5 years of annual reporting

Table 1 below summarizes the last 5 years of annual reporting. In order to include 5 years of BOC pass rates, the table includes a six year period.

The post-graduation placement rate for both MLT and MLS graduates is 100% as defined by NAACLS, which states: The number who found employment (in the field or related field) and/or continued their education within one year of graduation. The BOC rates shown display pass rate within one year of graduation.

Enrolled=students registered for any MLS course (s) during the academic fiscal year.

Table 1

Academic Year	Numbered of students enrolled		Graduation Rates		BOC Certification Pass Rates		Placement Rates	
	MLT	MLS	MLT	MLS	MLT	MLS	MLT	MLS
2018-19	361	427	100%	100%	N/A	N/A	100%	100%
2017-18	112	120	97%	98.5%	95%	84%	100%	100%
2016-17	113	123	97%	98.5%	88%	92%	100%	100%
2015-16	76	63	94.5%	98.5%	95%	84%	100%	100%
2014-15	90	105	96.2%	97.4%	97.5%	88%	100%	100%
2013-14	N/A	N/A	N/A	N/A	93%	94%	N/A	N/A

Analysis of Outcomes Measures

Program outcomes for MLT and MLS are as follows:

1. Knowledge Goal: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.
2. Knowledge Goal: Apply mathematical calculations to laboratory situations.
3. Laboratory Skill: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.
4. Laboratory Skill: Correlate laboratory theory and terminology to practical laboratory work.
5. Laboratory Skill: Gather additional laboratory data and apply problem solving skills to solve problems/discrepancies.
6. Diagnostic Skill: Relate laboratory findings to common disease processes.
7. Professionalism and Ethics: Demonstrate professional conduct and ethical behavior.
8. Communication Skill: Demonstrate effective communication skills and behaviors with colleagues in the program and in a laboratory setting.

Analysis of Outcomes

To analyze outcomes measures and promote continuous quality improvement, the MLS department at WSU administers a variety of assessments in each course as outlined in **Table 2.** Analysis of outcomes per MLS course begins on page 15 of this report.

Table 2:

Core Courses- See Learning Outcomes and key on the next page.	Learning Outcomes							
	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5	Goal 6	Goal 7	Goal 8
MLS 1010 Core Clinical Laboratory Skills	A	U	A	A	E	U	A	E
MLS 1001 Online Orientation for AAS Degree*	NA	NA	NA	NA	NA	NA	E	E
MLS 1113 Introduction to Laboratory Practices	A	U	A	A	E	U	A	E
MLS 1114 Principles of Hematology and Hemostasis	A	A	A	A	E	A	E	E
MLS 2211 Principles of Clinical Chemistry I	A	A	A	U	E	U	U	U
MLS 2212 Principles of Clinical Microbiology I	A	U	A	U	U	A	U	U
MLS 2213 Principles of Clinical Chemistry II	A	A	A	U	E	U	U	U
MLS 2214 Principles of Clinical Microbiology II	A	U	A	U	U	A	U	U
MLS 2210 Principles of Clinical Immunohematology	A	U	A	A	A	E	E	E
MLS 3301 Online Orientation for BS Degree*	NA	NA	NA	NA	NA	NA	E	E
MLS 3302 Biostatistics, Research Methods, and Laboratory Practices	A	A	NA	U	U	NA	E	A
MLS 3310 Advanced Immunohematology	A	U	A	A	A	E	E	E
MLS 3312 Clinical Immunology and Virology	A	U	A	U	I	E	I	E
MLS 3313 Advanced Hematology and Hemostasis	A	A	A	A	E	A	E	E
MLS 3314 Advanced Clinical Chemistry	A	U	I	E	A	A	U	E
MLS 3316 Advanced Clinical Microbiology and Molecular Diagnostics	A	U	A	U	A	A	U	U
MLS 4409 Clinical Correlation	E	I	NA	I	E	A	U	NA
MLS 4410 Interdisciplinary Healthcare Teams	U	U	NA	U	E	E	A	A
MLS 4411 MLS Simulated Laboratory I	U	U	A	U	A	U	A	A
MLS 4412 MLS Simulated Laboratory II	U	A	U	U	E	NA	U	A
MLS 4415 Laboratory Teaching and Supervision	NA	NA	NA	NA	U	NA	A	A
MLS 4803 Research Projects in MLS I	U	U	E	E	NA	NA	A	A
MLS 4804 Research Projects in MLS II	A	A	A	A	A	U	A	A

*Online students only

Program Outcomes
1. Knowledge Goal: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.
2. Knowledge Goal: Apply mathematical calculations to laboratory situations.
3. Laboratory Skill: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.
4. Laboratory Skill: Correlate laboratory theory and terminology to practical laboratory work.
5. Laboratory Skill: Gather additional laboratory data and apply problem solving skills to solve problems/discrepancies.
6. Diagnostic Skill: Relate laboratory findings to common disease processes.
7. Professionalism and Ethics: Demonstrate professional conduct and ethical behavior.
8. Communication Skill: Demonstrate effective communication skills and behaviors with colleagues in the program and in a laboratory setting.

Key:
I=Introduced

E = Emphasized
U = Utilized
A = Assess comprehensively
NA = Not Addressed

Program Assessment and Quality Improvement

In addition to course analyses, the following assist in measuring on-going quality of the MLT and MLS programs

- Analysis of BOC Scores: Scores for the BOC for the most recent year are analyzed and compared with prior years to detect trends. Each faculty is given a copy of compiled student scores broken down by discipline including average scores for the past 3-4 years.
- Advisory Board Meetings: Annual meeting with WSU's advisory board assists in obtaining firsthand knowledge from community clinics and hospitals hosting MLS students in clinical rotations.
- Graduate Exit Surveys: Feedback from alumni allows for continued improvement and quality in the programs.
- Annual Staff Retreat: A yearly meeting assists in gathering feedback from faculty and staff, assess what's working and establish goals for the next academic year.
- Student evaluations are completed in each course by the students at the end of the semester. The evaluations are analyzed and compiled by the Department Chair and are used in yearly faculty evaluations and tenure reviews.
- Faculty annual review on full time and adjunct faculty during the summer with individual faculty and the department chair. Student evaluations are reviewed and discussed in detail. Goals and expectations are set and reviewed.
- Tenure-track faculty second year reviews Done by the department chair according to university policy, and with the results submitted to the faculty professional files.
- Peer reviews of all faculty are conducted during the third and sixth years of the tenure process by a department peer review committee using guidelines established by the college ranking and tenure document.
- Ranking and tenure reviews are conducted by a college ranking and tenure committee in accordance to the policy and procedures of the university and college. The evaluation measures effectiveness in teaching, scholarship and service. The results are submitted to the faculty professional files in the department and College.

Non Quantifiable Measures

Professionalism, ethics, and communication skills (program goals 7 and 8) are standards for which quantitative measures are not suitable. The affective domain rubric (Table 3) provides a consistent measure of such skills and the ability for faculty to measure students' abilities in the realm of communication and ethics. This assessment is used as a metric for students who wish to enter the MLT program and in MLS student labs, thereafter.

Table 3. Affective Domain Assessment

I. Instructions	Needs Improvement	Satisfactory
Prepares prior to laboratory session by reading appropriate procedure(s) to be performed.	1 2 3	4 5
Listens to instructor's demonstration/ oral directions and takes notes as necessary before beginning laboratory work.	1 2 3	4 5
Works independently when required.	1 2 3	4 5
Attempts to look for answers to questions in the "principle of test" section at the beginning of each procedure, case studies, and the laboratory instructions before asking the instructor.	1 2 3	4 5
II. Procedures		
Uses proper and safe techniques in manual manipulations: pipetting, use of PPE, order of addition of reagents, mixing, etc.	1 2 3	4 5
Wears appropriate lab attire.	1 2 3	4 5
Works in a methodical and reasonable pace, within appropriate intervals and acceptable test turn-around times.	1 2 3	4 5
Results reflect the student's own work.	1 2 3	4 5
III. Professionalism		
Participates in group discussions.	1 2 3	4 5
Accepts constructive criticism.	1 2 3	4 5
Uses assertive communication instead of passive or aggressive communication styles with fellow students and instructor.	1 2 3	4 5
Demonstrates positive attitude toward workload, even if challenging patient situations, lengthy procedures, or complex testing are involved.	1 2 3	4 5
Appropriately manages stress levels by minimizing distractions to self and others. Does not talk excessively about subjects unrelated to this laboratory.	1 2 3	4 5
Comes to lab on time, prepared to work.	1 2 3	4 5
IV. Laboratory Skills		
Consistently attempts to organize work efficiently.	1 2 3	4 5
Completes all assignments, written and practical, on time.	1 2 3	4 5
Identifies errors and takes corrective action as soon as possible.	1 2 3	4 5

Performs all laboratory procedures, applying high standards of quality, confidence, and integrity.	1 2 3	4 5
Performs procedures after the initial instruction with ease, accuracy, and minimal assistance from fellow students, TAs, and/or instructor.	1 2 3	4 5
Keeps work area clean.	1 2 3	4 5

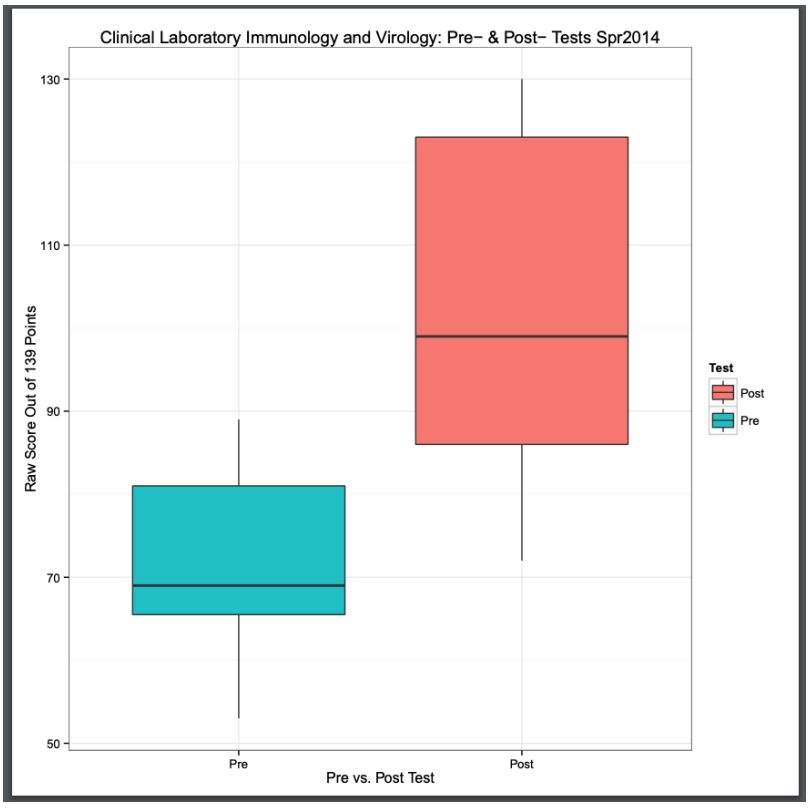
Program Changes/Improvements

No significant program changes have occurred in the last 5 years. Personnel changes include the appointment of new Department Chair and a new Program Director, which took place in 2016 and 2018, respectively. Credentials and contact information are located on the cover page of this report. A number of junior faculty also joined the department as well as a second laboratory manager.

Ongoing Curriculum Development

Addition of Clinical Immunology Course in 2015

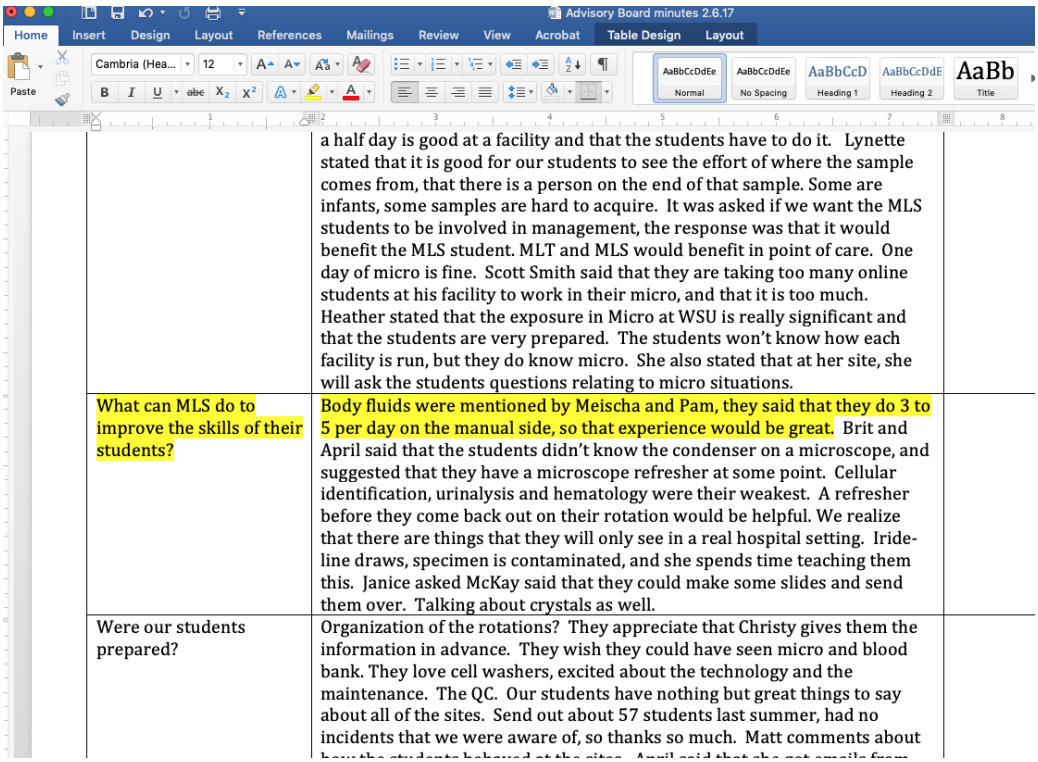
As previously mentioned, BOC scores are part of WSU's ongoing MLS program assessment. As of fall of 2015 a Clinical Immunology and Virology Course was added to the MLS curriculum to address a trend of lower BOC scores in that discipline and to offer students a clinically based Immunology course. Upon addition of the course, Immunology BOC scores have shown improvement. Below is a graph put together by the instructor that demonstrates improvement.



Future Courses

Two new courses are in the plans to be added Fall 2021. Both courses will be taught at the MLS level. Urinalysis and Body Fluids and Molecular Diagnostics attempt to address similar BOC trends (particularly in Body Fluids) and will add instruction relevant to current methodologies in MLS. In addition, the courses serve to address **advisory board and employer feedback** regarding

students' unfamiliarity in these areas upon entry level employment. The screenshot below shows the minutes for the advisory board meeting where the issue of Body Fluids was first brought up in 2017.



	a half day is good at a facility and that the students have to do it. Lynette stated that it is good for our students to see the effort of where the sample comes from, that there is a person on the end of that sample. Some are infants, some samples are hard to acquire. It was asked if we want the MLS students to be involved in management, the response was that it would benefit the MLS student. MLT and MLS would benefit in point of care. One day of micro is fine. Scott Smith said that they are taking too many online students at his facility to work in their micro, and that it is too much. Heather stated that the exposure in Micro at WSU is really significant and that the students are very prepared. The students won't know how each facility is run, but they do know micro. She also stated that at her site, she will ask the students questions relating to micro situations.
What can MLS do to improve the skills of their students?	Body fluids were mentioned by Meischa and Pam, they said that they do 3 to 5 per day on the manual side, so that experience would be great. Brit and April said that the students didn't know the condenser on a microscope, and suggested that they have a microscope refresher at some point. Cellular identification, urinalysis and hematology were their weakest. A refresher before they come back out on their rotation would be helpful. We realize that there are things that they will only see in a real hospital setting. Iride-line draws, specimen is contaminated, and she spends time teaching them this. Janice asked McKay said that they could make some slides and send them over. Talking about crystals as well.
Were our students prepared?	Organization of the rotations? They appreciate that Christy gives them the information in advance. They wish they could have seen micro and blood bank. They love cell washers, excited about the technology and the maintenance. The QC. Our students have nothing but great things to say about all of the sites. Send out about 57 students last summer, had no incidents that we were aware of, so thanks so much. Matt comments about

More flexibility in Online Courses:

In fall semester of 2017 all MLS online courses began to be offered every semester for added flexibility to online students**.**

Data Management

Upon initiation of online course offerings every semester, enrollment has significantly increased. The MLS department has contracted a programmer to create a custom database to increase accuracy of records and reports. Improved data management, explains the increase in numbers enrolled as the university is more efficiently tracking declared majors in our programs, along with increasing enrollment numbers in the online program.

Budget /New Instrumentation

To continue to excel in a simulation-based curriculum, the MLS department budgeted funds to secure a laboratory information system (LIS) equipped with interface to be operated by students in SIM lab. The LIS was officially introduced in 2014. New Chemistry and Coagulation analyzers were also added to SIM lab in 2016 and 2017, respectively. We have also added two new hematology analyzers in 2015 and 2017. Microbiology added a new blood culture analyzer and automated organism ID instrument this year. Funds are allocated every year to acquire new or updated instrumentation for simulated labs.

Evidence of Learning by Course

Evidence of Learning: MLS 1010 Core Laboratory Skills

Evidence of Learning: Courses within the Major: MLS 1010					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.	Measure 1: 6 Unit exams and one comprehensive final where students are assessed through multiple choice questions and case study scenarios	Measure 1: Students are expected to score 80% or better to prove knowledge and competency	Measure 1: The majority of students were able to achieve 80% or higher competency	Measure 1: Only the students who achieve competency are eligible to be admitted to the MLS program.	Measure 1: No changes needed at this time
	Measure 2 12 laboratory sessions that focus on concept application and practical work	Measure 1: Students are expected to score 80% or better to prove knowledge and competency	Measure 1: The majority of students were able to achieve 80% or higher competency	Measure 1: Only the students who achieve competency are eligible to be admitted to the MLS program.	Measure 1: No changes needed at this time
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	Measure 1: Multiple choice questions in Exam 4 assess absolute and raw sperm counts	Measure 1: Students will score 80% or better on 50 questions.	Measure 1: The majority of students scored 80% or better on Exam 4.	Measure 1: Most students successfully applied mathematical calculations to laboratory situations.	Measure 1: No changes needed at this time
	Measure 2: Formative assessment in the form of a group	Measure 2: Students will correctly perform mathematical	Measure 2: The majority of the students correctly performed	Measure 2: Students understand the concept and are	Measure 2: No changes needed at this time

Evidence of Learning: Courses within the Major: MLS 1010					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	quiz during lecture following the sperm count lecture assesses calculating absolute and raw sperm counts.	calculations in class and answer questions as a group and be able to apply to laboratory situations.	mathematical calculations in class.	able to apply it in laboratory situations.	
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.	Measure 1: Unit 4 Exam tests knowledge theory of Phlebotomy	Measure 1: The majority of the students will score 80% or better on 50 questions	Measure 1: The majority of students scored 80% or better on Exam 4.	Measure 1: Students successfully demonstrated their understanding of phlebotomy theory.	Measure 1: No changes needed at this time
	Measure 2: Demonstrate knowledge of phlebotomy by successfully performing a syringe and a vacutainer draw on a classmate.	Measure 2: Students will correctly perform phlebotomy on a classmate.	Measure 2: The majority of students were able to successfully perform phlebotomy.	Measure 2: Most students were able to apply the theory learned and successfully draw blood.	Measure 2: No changes needed at this time
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: Exam 3 uses 50 multiple choice questions to assess theory on reagent test strips and correlate it with urine microscopic analysis.	Measure 1: Students will score 80% or better on 50 questions.	Measure 1: The majority of students scored 80% or better on 50 questions	Measure 1: Most students successfully correlated laboratory theory of reagent test strips to microscopic urinalysis	Measure 1: No changes needed at this time

Evidence of Learning: Courses within the Major: MLS 1010					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
				performed as practical work.	
	Measure 2: Five laboratory sessions requiring students to perform urine microscopic examination and reagent test strips.	Measure 2: Students must score 80% or better on laboratory assignments.	Measure 2: The majority of students scored 80% or better on urine microscopic and reagent test strips laboratory assignments.	Measure 2: The majority of students performed the required skills during their laboratory assignments demonstrating proficiency in urinalysis.	Measure 2: No clinical changes needed at this time
Learning Outcome 5: Gather additional laboratory data and apply problem solving skills to solve problems/discrepancies.	Measure 1: A set of Urinalysis Case Studies from Unit 2.	Measure 1: Students will score 80% or better on 6 case studies.	Measure 1: The majority of students scored 80% or better on 6 case studies.	Measure 1: The majority of students successfully demonstrated theory underlying urinalysis and how it relates to renal disease.	Measure 1: No changes needed at this time
Learning Outcome 6: Relate laboratory findings to common disease.	Measure 1: A set of Urinalysis Case Studies from Unit 2.	Measure 1: Students will score 80% or better on 6 case studies.	Measure 1: The majority of students scored 80% or better on 6 case studies.	Measure 1: The majority of students successfully demonstrated theory underlying urinalysis and how it relates to renal disease.	Measure 1: No changes needed at this time

Evidence of Learning: Courses within the Major: MLS 1010					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	Measure 2: 50 questions on Exam 3 dealing with renal disease.	Measure 2: Students will score 80% or better on the Unit 2 exam.	Measure 2: The majority of students were able to score 80% or better.	Measure 2: The majority of students correctly related laboratory findings to common renal diseases.	Measure 2: No changes needed at this time.
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: Attendance and punctuality expectations defined in course syllabus.	Measure 1: Students will attend laboratory section and be punctual.	Measure 1: The majority of students attended laboratory sessions unless previously excused.	Measure 1: The majority of students attended laboratory sessions and most were punctual.	Measure 1: No changes needed at this time.
	Measure 2: Adherence to laboratory dress code and safety procedures through viewing safety videos and discussions during the first lab session.	Measure 2: Students will comply with dress code and safety procedures.	Measure 2: All students complied with dress code and safety procedures.	Measure 2: Most students were in compliance with dress code and safety procedures. OSHA compliant dress was a problem at times.	Measure 2: For campus students, addition of a self-assessment tool for OSHA compliance, worth points OR require all students wear scrubs to lab.
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the program and in the laboratory	Measure 1: Class discussions and open-ended questions	Measure 1: Students will participate in class discussions when open ended questions are asked regarding the material.	Measure 1: Students are able to communicate their knowledge through class discussion	Measure 1: All students were able to communicate their knowledge through class discussions.	Measure 1: No changes needed at this time.

Evidence of Learning: Courses within the Major: MLS 1010					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	Measure 2: Reflective questions as part of phlebotomy lab competency.	Measure 2: Students will be able to respond to 2 reflective questions and evaluate their own performance.	Measure 2: Students will evaluate themselves and offer suggestions on how they can improve their phlebotomy skills.	Measure 2: Students reflected on their skills and self-evaluated allowing them to find ways to improve.	Measure 2: No clinical changes needed at this time.

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.
** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.

Summary: MLS 1010: Core Laboratory Skills
This course encompasses principles and applications to laboratory testing including safe practices for the laboratory practitioner, specimen quality assurance, phlebotomy, urinalysis, basic concepts in clinical immunology, and clinical approaches to immunological testing. Laboratory session addresses the principles and applications to laboratory testing including safe practices for the laboratory practitioner, specimen quality assurance, phlebotomy, urinalysis, basic concepts in clinical immunology, and clinical approaches to immunological testing. This course along with 6 months of clinical experience qualifies students to sit for the MLA (ASCP) exam under route 6. Data based on instruction from 2014-present by Janice Thomas.

Evidence of Learning: Courses within the Major: MLS 1113

Evidence of Learning: Courses within the Major: MLS 1113					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.	Measure 1: 6 Unit exams and one comprehensive final where students are assessed through multiple choice questions and case study scenarios	Measure 1: Students are expected to score 80% or better to prove knowledge and competency	Measure 1: The majority of students were able to achieve 80% or higher competency	Measure 1: Only the students who achieve competency are eligible to be admitted to the MLS program.	Measure 1: No changes needed at this time
	Measure 2 12 laboratory sessions that focus on concept application and practical work	Measure 1: Students are expected to score 80% or better to prove knowledge and competency	Measure 1: The majority of students were able to achieve 80% or higher competency	Measure 1: Only the students who achieve competency are eligible to be admitted to the MLS program.	Measure 1: No changes needed at this time
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	Measure 1: Multiple choice questions in Exam 4 assess absolute and raw sperm counts	Measure 1: Students will score 80% or better on 50 questions.	Measure 1: The majority of students scored 80% or better on Exam 4.	Measure 1: Most students successfully applied mathematical calculations to laboratory situations.	Measure 1: No changes needed at this time
	Measure 2: Formative	Measure 2:	Measure 2:	Measure 2: Students	Measure 2:

Evidence of Learning: Courses within the Major: MLS 1113					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	assessment in the form of a group quiz during lecture following the sperm count lecture assesses calculating absolute and raw sperm counts.	Students will correctly perform mathematical calculations in class and answer questions as a group and be able to apply to laboratory situations.	The majority of the students correctly performed mathematical calculations in class.	understand the concept and are able to apply it in laboratory situations.	No changes needed at this time
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.	Measure 1: Unit 4 Exam tests knowledge theory of Phlebotomy	Measure 1: The majority of the students will score 80% or better on 50 questions	Measure 1: The majority of students scored 80% or better on Exam 4.	Measure 1: Students successfully demonstrated their understanding of phlebotomy theory.	Measure 1: No changes needed at this time
	Measure 2: Demonstrate knowledge of phlebotomy by successfully performing a syringe and a vacutainer draw on a classmate.	Measure 2: Students will correctly perform phlebotomy on a classmate.	Measure 2: The majority of students were able to successfully perform phlebotomy.	Measure 2: Most students were able to apply the theory learned and successfully draw blood.	Measure 2: No changes needed at this time

Evidence of Learning: Courses within the Major: MLS 1113					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: Exam 3 uses 50 multiple choice questions to assess theory on reagent test strips and correlate it with urine microscopic analysis.	Measure 1: Students will score 80% or better on 50 questions.	Measure 1: The majority of students scored 80% or better on 50 questions	Measure 1: Most students successfully correlated laboratory theory of reagent test strips to microscopic urinalysis performed as practical work.	Measure 1: No changes needed at this time
	Measure 2: Five laboratory sessions requiring students to perform urine microscopic examination and reagent test strips.	Measure 2: Students must score 80% or better on laboratory assignments.	Measure 2: The majority of students scored 80% or better on urine microscopic and reagent test strips laboratory assignments.	Measure 2: The majority of students performed the required skills during their laboratory assignments demonstrating proficiency in urinalysis.	Measure 2: No clinical changes needed at this time

Evidence of Learning: Courses within the Major: MLS 1113					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 5: Gather additional laboratory data and apply problem solving skills to solve problems/discrepancies.	Measure 1: A set of Urinalysis Case Studies from Unit 2.	Measure 1: Students will score 80% or better on 6 case studies.	Measure 1: The majority of students scored 80% or better on 6 case studies.	Measure 1: The majority of students successfully demonstrated theory underlying urinalysis and how it relates to renal disease.	Measure 1: No changes needed at this time
Learning Outcome 6: Relate laboratory findings to common disease.	Measure 1: A set of Urinalysis Case Studies from Unit 2.	Measure 1: Students will score 80% or better on 6 case studies.	Measure 1: The majority of students scored 80% or better on 6 case studies.	Measure 1: The majority of students successfully demonstrated theory underlying urinalysis and how it relates to renal disease.	Measure 1: No changes needed at this time
	Measure 2: 50 questions on Exam 3 dealing with renal disease.	Measure 2: Students will score 80% or better on the Unit 2 exam.	Measure 2: The majority of students were able to score 80% or better.	Measure 2: The majority of students correctly related laboratory findings to common renal diseases.	Measure 2: No changes needed at this time.

Evidence of Learning: Courses within the Major: MLS 1113					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: Attendance and punctuality expectations defined in course syllabus.	Measure 1: Students will attend laboratory section and be punctual.	Measure 1: The majority of students attended laboratory sessions unless previously excused.	Measure 1: The majority of students attended laboratory sessions and most were punctual.	Measure 1: No changes needed at this time.
	Measure 2: Adherence to laboratory dress code and safety procedures through viewing safety videos and discussions during the first lab session.	Measure 2: Students will comply with dress code and safety procedures.	Measure 2: All students complied with dress code and safety procedures.	Measure 2: Most students were in compliance with dress code and safety procedures. OSHA compliant dress was a problem at times.	Measure 2: For campus students, addition of a self-assessment tool for OSHA compliance, worth points OR require all students wear scrubs to lab.
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the program and in the laboratory	Measure 1: Class discussions and open-ended questions	Measure 1: Students will participate in class discussions when open ended questions are asked regarding the material.	Measure 1: Students are able to communicate their knowledge through class discussion	Measure 1: All students were able to communicate their knowledge through class discussions.	Measure 1: No changes needed at this time.
	Measure 2: Reflective questions as part of	Measure 2: Students will be able to respond to	Measure 2: Students will evaluate	Measure 2: Students reflected on their skills and	Measure 2: No clinical changes

Evidence of Learning: Courses within the Major: MLS 1113					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	phlebotomy lab competency.	2 reflective questions and evaluate their own performance.	themselves and offer suggestions on how they can improve their phlebotomy skills.	self-evaluated allowing them to find ways to improve.	needed at this time.

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.

** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.

Summary: MLS 1113: Introduction to laboratory practices.

This course encompasses principles and applications to laboratory testing including safe practices for the laboratory practitioner, specimen quality assurance, phlebotomy, urinalysis, basic concepts in clinical immunology, and clinical approaches to immunological testing. Laboratory session addresses the principles and applications to laboratory testing including safe practices for the laboratory practitioner, specimen quality assurance, phlebotomy, urinalysis, basic concepts in clinical immunology, and clinical approaches to immunological testing. Data based on instruction from 2014-present by Janice Thomas.

Evidence of Learning: Courses within the Major: MLS 1114 Principles of Hematology and Hemostasis

Evidence of Learning: MLS 1114					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem-solving skills.	Measure 1: The Unit 1 exam tests the principles of hematology testing. The Unit 5 exam tests the principles of hemostasis testing. 50 multiple choice questions each.	Measure 1: > 90% of students must score 80% or better on exams, proving competency. If they do not score above 80%, they are required to score well on a retake exam to prove competency.	Measure 1: 95% of students scored 80% or better on both exams.	Measure 1: 95% of students successfully demonstrated theory underlying laboratory testing	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: 11 graded laboratory practice sessions and 2 comprehensive lab practical's.	Measure 2: >90% of Students are required to score above an 80% in laboratory skills and competencies.	Measure 2: 100% of students were able to correctly perform required laboratory skills	Measure 2: All students correctly performed required laboratory skills	Measure 2: No clinical changes needed at this time
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	Measure 1: Many multiple-choice questions requiring mathematical calculations in exam 1, 2 and 5	Measure 1: >90% of students will score 80% or better on these questions.	Measure 1: 95% of students scored 80% or better on 8 questions.	Measure 1: 95% of students successfully applied mathematical calculations to	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: MLS 1114					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
				laboratory situations.	
	Measure 2: Laboratory sessions requiring applications of laboratory mathematical calculations	Measure 2: >90% of students will correctly perform mathematical calculations in laboratory situations.	Measure 2: 100% of students correctly performed mathematical calculations in laboratory situations.	Measure 2: 100% of students correctly performed mathematical calculations in laboratory situations.	Measure 2: No clinical changes needed at this time
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.	Measure 1: 50 multiple choice questions from Exam 1 and 10 multiple choice questions from Exam 5	Measure 1: >90% of students will score >80% on 60 questions	Measure 1: 95% of students scored 80% or better on 20 questions.	Measure 1: 95% of students successfully demonstrated knowledge of evaluating specimen acceptability and optimal analysis methods.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Demonstrate proper knowledge of specimen criteria in a hematology laboratory setting	Measure 2: >90% of students will correctly determine proper sample suitability.	Measure 2: >95% of students were able to correctly determine proper sample suitability for hematology analysis	Measure 2: All students correctly determined proper sample suitability.	Measure 2: No clinical changes needed at this time

Evidence of Learning: MLS 1114					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: 50 multiple choice questions each from exams 2, 3, and 4	Measure 1: >90% of students will score 80% or better on all questions.	Measure 1: >95% of students scored 80% or better on 20 questions	Measure 1: >95% of students successfully correlated laboratory theory and terminology to practical laboratory work.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Evaluate abnormal hematology smears from a wide variety of disorders during 6 laboratory sessions. Assess competency during 1 laboratory practical exam	Measure 2: >90% of students will score 80% or better on the laboratory practical exam and participate in all required laboratory sessions.	Measure 2: >95% of students scored 80% or better on the laboratory practical exam and participated in all required laboratory sessions.	Measure 2: >95% of students performed the required skills during the laboratory practical exam and required laboratory sessions.	Measure 2: No clinical changes needed at this time
Learning Outcome 5: Gather additional laboratory data and apply problem solving skills to solve problems/discrepancies.	Measure 1: A set of 15 multiple choice questions from Exams 1 and 5	Measure 1: >90% of students will score 80% or better on 20 questions.	Measure 1: >95% of students scored 80% or better on 20 questions.	Measure 1: >95% of students successfully demonstrated problem solving skills	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: MLS 1114					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	Measure 2: Students correlate patient history and diagnoses to laboratory findings in 6 laboratory sessions	Measure 2: >90% of students will correctly correlate patient history and diagnoses to laboratory findings in 6 laboratory sessions	Measure 2: >95% of students were able to correctly correlate patient history and diagnoses to laboratory findings in 6 laboratory sessions	Measure 2: >95% of students correctly correlated patient history and diagnoses to laboratory findings in 6 laboratory sessions	Measure 2: No clinical changes needed at this time
Learning Outcome 6: Relate laboratory findings to common disease.	Measure 1: 50 multiple choice questions each from exams 2, 3, and 4, and 25 questions from exam 5.	Measure 1: >90% of students will score 80% or better on 50 multiple choice questions each from exams 2, 3, and 4, and 25 questions from exam 5.	Measure 1: >95% of students scored 80% or better on 50 multiple choice questions each from exams 2, 3, and 4, and 25 questions from exam 5.	Measure 1: >95% of students correctly related laboratory findings to common diseases.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: In 6 laboratory sessions students relate laboratory findings to common diseases	Measure 2: >90% of students will perform the required skills in the laboratory	Measure 2: 100% of students were able to relate laboratory findings to common diseases.	Measure 2: >95% of students correctly related laboratory findings to common diseases.	Measure 2: No clinical changes needed at this time

Evidence of Learning: MLS 1114					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: Attendance and punctuality expectations defined in course syllabus	Measure 1: >95% of students will attend laboratory section and be punctual.	Measure 1: 100% attendance in laboratory section. >95% punctuality	Measure 1: >95% of students attended laboratory section and most were punctual	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Adherence to laboratory dress code and safety procedures	Measure 2: >95% of students will comply with dress code and safety procedures.	Measure 2: 100% of students complied with dress code and safety procedures	Measure 2: >95% of students were in compliance with dress code and safety procedures.	Measure 2: No clinical changes needed at this time
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the program and in the laboratory	Measure 1: Laboratory etiquette and expectations are defined in the syllabus. Measured by punctuality and participation.	Measure 1: >95% of students will be punctual to laboratory sessions, and remain task-oriented throughout the session in order to receive full participation credit.	Measure 1: >95% of students were punctual to laboratory sessions, and remained task-oriented throughout the session and received full participation credit.	Measure 1: >95% of students demonstrated effective communication skills through punctuality and tasks during laboratory sessions.	Measure 1: No curricular or pedagogical changes needed at this time

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.

** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.

Summary: MLS 1114 is an introductory hematology course covering:

- The theory and principles of hematology and hemostasis relevant to routine laboratory testing
- Normal erythrocyte physiology and associated disorders
- Normal leukocyte physiology and associated non-malignant and malignant blood disorders
- Normal platelet and coagulation physiology and associated disorders.

MLS 1114 contains all eight of the program's identified learning goals in varying amounts. As noted in the curriculum map, learning goals 5 and 8 are areas of introduction, learning goals 1 and 3 are emphasized, and learning goals 2, 4, 6, and 7 are utilized.

Evidence of Learning: Courses within the Major: MLS 2212 Principles of Clinical Microbiology I

Evidence of Learning: MLS 2212					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.	Measure 1: 3 quizzes (100% of questions), 4 exams and comprehensive final (75% of questions)	Measure 1: 100% of students will score 80% or better on all test questions (quizzes are excluded)	Measure 1: Approx. 86% of students scored 80% or better on all exams (avg. 25 of 29 students)	Measure 1: 86% of students successfully demonstrated theory underlying laboratory testing	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: 13 weeks of graded laboratory activities and 2 practical in-lab exams	Measure 2: 100% of students will score 80% or better by correctly performing required laboratory skills	Measure 2: 100% of students were able to correctly perform required laboratory skills	Measure 2: All students correctly performed required laboratory skills	Measure 2: No clinical changes needed at this time
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	Measure 1: 1-2 questions on quiz 2 and exam 2, fill-in-the blank and multiple choice	Measure 1: 100% of students will score 80% or better on math questions	Measure 1: 100% of students scored 80% or better on math questions	Measure 1: All students successfully applied mathematical calculations to laboratory situations	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: 6 weekly laboratory activities with 1-2 unknown patient	Measure 2: 100% of students will score 80% or better on	Measure 2: 100% of students correctly performed	Measure 2: All students correctly performed mathematical	Measure 2: No clinical changes needed at this time

Evidence of Learning: MLS 2212					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	specimens per week which utilize correct reporting of urine cultures involving mathematical calculations	mathematical calculations in laboratory situations	mathematical calculations 80% or better in laboratory situations	calculations in lab situations 80% of the time or better	
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.	Measure 1: 13 weeks of graded laboratory activities, each involving identification of bacterial unknown specimens and 2 practical in-lab exams	Measure 1: 100% of students will score 80% or better on laboratory activities and practical exams	Measure 1: 100% of students scored 80% or better overall on final course laboratory grade	Measure 1: All students successfully demonstrated knowledge of evaluating specimen acceptability and optimal analysis methods.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Demonstrate proper knowledge of quality assurance procedures in clinical microbiology laboratory	Measure 2: 100% of students will correctly determine proper quality assurance procedures in clinical microbiology laboratory	Measure 2: 100% of students were able to correctly determine proper quality assurance procedures in clinical microbiology laboratory	Measure 2: All students correctly determined quality assurance procedures in clinical microbiology laboratory	Measure 2: No clinical changes needed at this time

Evidence of Learning: MLS 2212					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: All course exams and 3 quizzes have 50% of questions that correlate theory/terminology to laboratory testing	Measure 1: 100% of students will score 80% or better	Measure 1: 86% of students scored 80% or better	Measure 1: 86% of students successfully correlated laboratory theory and terminology to practical laboratory work.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Assess 4-5 weekly laboratory unknowns in each of the 13 laboratory activities and 1 comprehensive lab final	Measure 2: 100% of students will score 80% or better overall on course laboratory activities and comprehensive lab final	Measure 2: 100% of students scored 80% or better overall on course laboratory activities and comprehensive lab final	Measure 2: All students performed the required skills during 13 lab activities and comprehensive lab final	Measure 2: No clinical changes needed at this time
Learning Outcome 5: Gather additional laboratory data and apply problem solving skills to solve problems/discrepancies.	Measure 1: Four case study homework assignments in Unit 2 and Unit 3.	Measure 1: 100% of students must complete assignments	Measure 1: 100% of students completed the four assignments.	Measure 1: All students successfully demonstrated problem solving skills	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: MLS 2212					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 6: Relate laboratory findings to common disease.	Measure 1: Exams 2,3,4 and the final exam contain approximately 10% diagnostic questions	Measure 1: 100% of students will score 80% or better on the diagnostic questions	Measure 1: 100% of students scored 80% or better on the diagnostic questions	Measure 1: All students correctly related laboratory findings to common diseases.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: In 11 of the weekly laboratory activities specimen source of unknowns is related to diseases	Measure 2: 100% of students will perform 80% or better relating specimen unknowns to related diseases	Measure 2: 100% of students were able to relate laboratory findings to common diseases 80% of the time	Measure 2: All students correctly related laboratory findings to common diseases.	Measure 2: No clinical changes needed at this time
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: Attendance and punctuality expectations defined in course syllabus	Measure 1: 100% of students will attend laboratory section and be punctual.	Measure 1: 100% attendance in laboratory section. 95% punctuality	Measure 1: All students attended laboratory section and most were punctual	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Adherence to laboratory dress code and safety procedures	Measure 2: 100% of students will comply with dress code and safety procedures.	Measure 2: 100% of students complied with dress code and safety procedures	Measure 2: All students were in compliance with dress code and safety procedures.	Measure 2: No clinical changes needed at this time
Learning Outcome 8: Demonstrate effective communication skills	Measure 1: Correct reporting (communication) of	Measure 1: 100% of students will correctly report	Measure 1: 100% of students were able to correctly	Measure 1: All students were able	Measure 1: No curricular or pedagogical

Evidence of Learning: MLS 2212					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
and behaviors with colleagues in the program and in the laboratory	laboratory results in 13 weekly activities.	results 80% or better on laboratory reports.	report results 80% or better on laboratory reports.	to correctly report laboratory reports.	changes needed at this time
	Measure 2: Students work in teams for 6 of 13 weekly laboratory activities	Measure 2: 100 % of students will demonstrate effective team work during the 6 weeks of laboratory activities	Measure 2: 100% of students demonstrated effective team work.	Measure 2: All students demonstrated effective team work.	Measure 2: No curricular or pedagogical changes needed at this time

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.

** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.

Summary: MLS 2212 – Principles in Clinical Microbiology I is an introductory clinical microbiology course provides an in-depth coverage of clinically significant bacteria including epidemiology, pathogenicity, and procedures for traditional laboratory identification. Major organisms include Gram positive cocci, enteric Gram negative rods, non-fermentative Gram negative rods, and miscellaneous Gram negative rods. This course contains all eight of the program's identified learning goals. In all cases, the measures show that 100% of the students are reaching all 8 goals at levels of 80% or above, so no curricular or clinical changes are seen as needed at this time. Data in this table are derived from two years and three sections of the course taught from Fall 2016-2018 by Kendal Beazer, with student results derived from the most recent cohort.

Evidence of Learning: Courses within the Major: MLS 2214 Principles of Clinical Microbiology II

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.	Measure 1: 2 quizzes (100% of questions), 3 exams and a comprehensive final (75% of questions)	Measure 1: 100% of students will score 80% or better on all test questions (quizzes are excluded)	Measure 1: Approx. 86% of students scored 80% or better all exams (avg. 24 of 28 students)	Measure 1: 86% of students successfully demonstrated theory underlying laboratory testing	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: 11 weeks of graded laboratory activities and 1 practical in-lab exam	Measure 2: 100% of students will score 80% or better by correctly performing required laboratory skills	Measure 2: 100% of students were able to correctly perform required laboratory skills	Measure 2: All students correctly performed required laboratory skills	Measure 2: No clinical changes needed at this time
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	Measure 1: 1-2 questions on exam 1 multiple choice	Measure 1: 100% of students will score 80% or better on math questions	Measure 1: 100% of students scored 80% or better on math questions	Measure 1: All students successfully applied mathematical calculations to laboratory situations	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: 3 weekly laboratory activities with 1-2	Measure 2: 100% of students will score 80% or	Measure 2: 100% of students correctly	Measure 2: All students correctly performed	Measure 2: No clinical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	unknown patient specimens and 1 week of hospital urine culture plates, which utilize correct reporting of urine cultures involving mathematical calculations.	better on mathematical calculations in laboratory situations	performed mathematical calculations 80% or better in laboratory situations	mathematical calculations in lab situations 80% of the time or better	
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.	Measure 1: 11 weeks of graded laboratory activities involving identification of bacteria, parasites, and fungi	Measure 1: 100% of students will score 80% or better on laboratory activities and practical exams	Measure 1: 100% of students scored 80% or better overall on final course laboratory grade	Measure 1: All students successfully demonstrated knowledge of evaluating specimen acceptability and optimal analysis methods.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Demonstrate proper knowledge of quality assurance procedures in clinical	Measure 2: 100% of students will correctly determine proper quality assurance procedures in clinical	Measure 2: 100% of students were able to correctly determine proper quality assurance procedures in clinical	Measure 2: All students correctly determined quality assurance procedures in clinical	Measure 2: No clinical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	microbiology laboratory	microbiology laboratory	microbiology laboratory	microbiology laboratory	
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: All course exams and 2 quizzes have 50% of questions that correlate theory/terminology to laboratory testing	Measure 1: 100% of students will score 80% or better on questions.	Measure 1: 86% of students scored 80% or better on questions	Measure 1: 86% of students successfully correlated laboratory theory and terminology to practical laboratory work.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Assess 4-5 weekly laboratory unknowns in each of the 11 laboratory activities	Measure 2: 100% of students will score 80% or better overall on course laboratory activities	Measure 2: 100% of students scored 80% or better overall on course laboratory activities	Measure 2: All students performed the required skills during 11 lab activities	Measure 2: No clinical changes needed at this time
Learning Outcome 5: Gather additional laboratory data and apply problem solving skills to solve problems/discrepancies.	Measure 1: Four case study homework assignments in Unit 4, 6, 8, and 11.	Measure 1: 100% of students must complete assignments	Measure 1: 100% of students completed the four assignments.	Measure 1: All students successfully demonstrated problem solving skills	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 6: Relate laboratory findings to common disease.	Measure 1: All exams contain approximately 20% diagnostic questions	Measure 1: 100% of students will score 80% or better on the diagnostic questions	Measure 1: 95% of students scored 80% or better on the diagnostic questions	Measure 1: 95% of students correctly related laboratory findings to common diseases.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: In 11 of the weekly laboratory activities, specimen source of unknowns is related to diseases	Measure 2: 100% of students will perform 80% or better relating specimen unknowns to related diseases	Measure 2: 100% of students were able to relate laboratory findings to common diseases 80% of the time	Measure 2: All students correctly related laboratory findings to common diseases.	Measure 2: No clinical changes needed at this time
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: Attendance and punctuality expectations defined in course syllabus	Measure 1: 100% of students will attend laboratory section and be punctual.	Measure 1: 100% attendance in laboratory section. 95% punctuality	Measure 1: All students attended laboratory section and most were punctual	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Adherence to laboratory dress	Measure 2: 100% of students will comply with dress	Measure 2: 100% of students complied with	Measure 2: All students were in compliance with	Measure 2: No clinical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	code and safety procedures	code and safety procedures.	dress code and safety procedures	dress code and safety procedures.	
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the program and in the laboratory	Measure 1: Correct reporting (communication) of laboratory results in 11 weekly activities.	Measure 1: 100% of students will correctly report results 80% or better on laboratory reports.	Measure 1: 100% of students were able to correctly report results 80% or better on laboratory reports.	Measure 1: All students were able to correctly report laboratory reports.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Students work in teams for 3 of 11 weekly laboratory activities	Measure 2: 100 % of students will demonstrate effective team work during the 3 weeks of laboratory activities	Measure 2: 100% of students demonstrated effective team work.	Measure 2: All students demonstrated effective team work.	Measure 2: No curricular or pedagogical changes needed at this time

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.

** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.

Summary: MLS 2214 – Principles in Clinical Microbiology II is an introductory course and is a continuation of MLS 2212, including antimicrobials, Gram positive rods, mycobacteria, anaerobes, mycology, and parasitology. This course contains all eight of the program's identified learning goals. In all cases, the measures show that 100% of the students are reaching all 8 goals at levels of 80% or above, so no curricular or clinical changes are seen as needed at this time. Data in this table are derived from two years and three sections of the course taught from Spring 2017-2019 by Kendal Beazer, with student results derived from the most recent cohort.

Evidence of Learning: Courses within the Major: MLS 2210 Principles of Immunohematology

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.	Measure 1: A set of 10 multiple choice questions from Exam 2	Measure 1: 100% of students will score 80% or better on 10 questions	Measure 1: 100% of students scored 80% or better on 10 questions)	Measure 1: All students successfully demonstrated theory underlying laboratory testing	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: 24 graded laboratory practice sessions and 2 practical exams	Measure 2: 100% of students will correctly perform required laboratory skills	Measure 2: 100% of students were able to correctly perform required laboratory skills	Measure 2: All students correctly performed required laboratory skills	Measure 2: No clinical changes needed at this time
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	Measure 1: A set of 20 multiple choice questions from Exams 3 and Final Exam	Measure 1: 100% of students will score 80% or better on 10 questions.	Measure 1: 100% of students scored 80% or better on 20 questions.	Measure 1: All students successfully applied mathematical calculations to laboratory situations.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: 2 graded laboratory applications of laboratory	Measure 2: 100% of students will correctly perform mathematical calculations in	Measure 2: 100% of students correctly performed mathematical	Measure 2: All students correctly performed mathematical calculations in	Measure 2: No clinical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	mathematical calculations	laboratory situations.	calculations in laboratory situations.	laboratory situations.	
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.	Measure 1: A set of 20 multiple choice questions from Exams 1 and 2	Measure 1: 100% of students will score 80% or better on 20 questions	Measure 1: 96% of students scored 80% or better on 20 questions.	Measure 1: All students successfully demonstrated knowledge of evaluating specimen acceptability and optimal analysis methods.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Demonstrate proper knowledge of specimen criteria in a blood bank laboratory setting	Measure 2: 100% of students will correctly determine proper sample suitability.	Measure 2: 100% of students were able to correctly determine proper sample suitability for blood bank analysis	Measure 2: All students correctly determined proper sample suitability.	Measure 2: No clinical changes needed at this time
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: A set of 20 multiple choice questions from Exams 2 and 3	Measure 1: 100% of students will score 80% or better on 20 questions.	Measure 1: 100% of students scored 80% or better on 20 questions	Measure 1: All students successfully correlated laboratory theory and terminology to	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
				practical laboratory work.	
	Measure 2: Assess unknowns with accuracy during 2 laboratory practical exams	Measure 2: 100% of students will score 80% or better on 2 laboratory practical exams	Measure 2: 99% of students scored 80% or better on 2 laboratory practical exams.	Measure 2: Most students performed the required skills during the 2 laboratory practical exams.	Measure 2: No clinical changes needed at this time
Learning Outcome 5: Gather additional laboratory data and apply problem-solving skills to solve problems/discrepancies.	Measure 1: A set of 20 multiple choice questions from Exams 2 and 3	Measure 1: 100% of students will score 80% or better on 20 questions.	Measure 1: 100% of students scored 80% or better on 20 questions.	Measure 1: All students successfully demonstrated problem solving skills	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Students resolve discrepancies in the laboratory sessions and must correlate patient history to laboratory findings	Measure 2: 100% of students will correctly resolve discrepancies in the laboratory sessions and correlate patient history to laboratory findings	Measure 2: 100% of students were able to correctly resolve discrepancies in the laboratory sessions and correlate patient history to laboratory findings	Measure 2: All students correctly resolved discrepancies in the laboratory sessions and correlated patient history to laboratory findings	Measure 2: No clinical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 6: Relate laboratory findings to common disease.	Measure 1: A set of 25 questions from Exams 2, 3, and 4	Measure 1: 100% of students will score 80% or better on 25 questions.	Measure 1: 100% of students scored 80% or better on 25 questions	Measure 1: All students correctly related laboratory findings to common diseases.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: In 2 laboratory sessions students relate laboratory findings to common diseases	Measure 2: 100% of students will perform the required skills in the laboratory	Measure 2: 100% of students were able to relate laboratory findings to common diseases.	Measure 2: All students correctly related laboratory findings to common diseases.	Measure 2: No clinical changes needed at this time
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: Attendance and punctuality expectations defined in course syllabus	Measure 1: 100% of students will attend laboratory section and be punctual.	Measure 1: 100% attendance in laboratory section. 89% punctuality	Measure 1: All students attended laboratory section and most were punctual	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Adherence to laboratory dress code and safety procedures	Measure 2: 100% of students will comply with dress code and safety procedures.	Measure 2: 100% of students complied with dress code and safety procedures	Measure 2: All students were in compliance with dress code and safety procedures.	Measure 2: No clinical changes needed at this time
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the	Measure 1: Responses to essay questions in exams 1, 2, and 3	Measure 1: 100% of students will score 80% or better on essay questions.	Measure 1: 100% of students were able to communicate their	Measure 1: All students were able to communicate their knowledge on the essay questions	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
program and in the laboratory			knowledge on the essay questions		
	Measure 2: Affective Domain Assessment in laboratory section regarding communication.	Measure 2: 100% of students will receive "satisfactory" marks in communication-related objectives in Affective Domain Assessment	Measure 2: 100% of students use professional and assertive communication with fellow students and instructor in the laboratory.	Measure 2: All students can communicate better as the course progresses	Measure 2: No changes needed at this time

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.

** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.

Summary: MLS 2210 is an introductory immunohematology course covering the theory and principles of Immunohematology relevant to blood group serology, antibody detection and identification, compatibility testing, component preparation and therapy in blood transfusion service, quality control, donor screening and phlebotomy, transfusion reactions and hemolytic disease of the fetus and newborn. MLS 2210 contains all eight of the program's identified learning goals, though in appropriately varying amounts. As noted in the curriculum map, learning goals 2,4,5,6 and 8 are areas of introduction, learning goal 1 is emphasized, and learning goals 3 and 7 are utilized. In all cases, the measures show that 100% of the students are reaching all 8 goals at levels of 80% or above, so no curricular or clinical changes are seen as needed at this time. Data in this table are derived from five sections of the course taught in Spring 2019 by Justin Rhees. This course was previously listed at MLS 2215 and was taught by Bill Zundel and Janet Oja from 2008-2018.

Evidence of Learning: Courses within the Major: MLS 2211 Principles of Clinical Chemistry I

Evidence of Learning: MLS 2211					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.	Measure 1: Each exam covers testing specific to the covered units.	Measure 1: Each student must complete the exam with a score of at least 80%.	Measure 1: All students with passing grades achieved a score of at least 80% on each unit exam.	Measure 1: All students with passing grades showed an acceptable level of understanding of the theory behind the testing discussed.	Measure 1: Findings indicate no changes are needed at this time.
	Measure 2: Students will complete laboratory exercises, which require understanding of the testing methods.	Measure 2: The total points earned from the laboratory must equal at least 80% of the points possible.	Measure 2: All students with passing grades earned at least 80% of the total points possible.	Measure 2: All students with passing grades showed competency of the covered topics and laboratory exercises.	Measure 2: Findings indicate no changes are needed at this time.
Learning Outcome 2:	Measure 1: Students must complete a 40-	Measure 1: Each student must pass the exam with a	Measure 1: All students with passing grades	Measure 1: All students with a passing grade can	Measure 1: Instituted review questions in all

Evidence of Learning: MLS 2211					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Apply mathematical calculations to laboratory situations.	question lab math exam before beginning lab work. Questions are repeated throughout the year to help students remember	score of at least 80%.	scored at least 80%.	successfully complete laboratory mathematics. Continual exposure to math throughout the year, assists with memory.	subsequent examinations
	Measure 2: Graded laboratory exercises, which include calculations.	Measure 2: All students must correctly complete laboratory calculations.	Measure 2: All students with passing grades earned at least 80% of the total points possible.	Measure 2: All students with passing grades can successfully complete laboratory mathematics.	Measure 2: Findings indicate no changes are needed at this time.
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, interpretation,	Measure 1: Students will complete a laboratory final with several exercises ranging in difficulty.	Measure 1: All students must complete the laboratory final with a score of at least 80%.	Measure 1: All students with passing grades earned a score of at least 80%.	Measure 1: All students with passing grades can successfully complete laboratory testing procedures ranging in difficulty.	Measure 1: Findings indicate no changes are needed at this time.

Evidence of Learning: MLS 2211					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
and use of quality assurance procedures.	Measure 2: Demonstrate knowledge of accurate sample requirements and collection procedures.	Measure 2: Students will assess samples submitted for testing for acceptability.	Measure 2: All students with passing grades have accurately demonstrated knowledge of sample requirements.	Measure 2: All students can assess samples for testing as appropriate.	Measure 2: Instituted clinical correlation exercises which deal with patient pathologies and specimen issues in testing to better inform the students regarding sample requirements and collection procedures
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: Students will correlate theory and terminology in all laboratory exercises.	Measure 1: Students will complete all laboratory correlation activities with a score of at least 80%.	Measure 1: All students with passing grades earned a score of at least 80%.	Measure 1: All students with passing grades can correlate theory to practical laboratory situations.	Measure 1: Findings indicate no changes are needed at this time.
	Measure 2: Students must test unknown samples during laboratory exercises.	Measure 2: Students must complete the laboratory section with at least 80%.	Measure 2: All students with passing grades earned a score of at least 80%.	Measure 2: All students with passing grades can correlate theory to practical laboratory situations.	Measure 2: Findings indicate no changes are needed at this time.

Evidence of Learning: MLS 2211					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 5: Gather additional laboratory data and apply problem solving skills to solve problems/discrepancies.	Measure 1: Students must gather all applicable data regarding the patient and use it for a tentative diagnosis	Measure 1: Students must obtain all pertinent information which is scored on their laboratory section, which must be at least 80%	Measure 1: All students with passing grades earned a score of at least 80%	Measure 1: All students with passing grades can gather laboratory data and use it to solve problems and discrepancies	Measure 1: Instituted QC labs prior to the introduction of a new test. Also instituted a Levy-Jennings problem-solving worksheet
	Measure 2: Not applicable.	Measure 2: Not applicable.	Measure 2: Not applicable.	Measure 2: Not applicable.	Measure 2: Not applicable.
Learning Outcome 6: Relate laboratory findings to common disease.	Measure 1: Each unit exam will test the student's ability to correlate laboratory findings to common diseases.	Measure 1: Each student must pass the exam with a score of at least 80%.	Measure 1: All students with passing grades earned a score of at least 80%.	Measure 1: All students with passing grades can accurately correlate laboratory findings to common diseases.	Measure 1: Findings indicate no changes are needed at this time.
	Measure 2: Laboratory exercises require	Measure 2: Students must identify laboratory	Measure 2: All students with passing grades	Measure 2: All students with passing grades can	Measure 2: Findings indicate no changes are

Evidence of Learning: MLS 2211					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	students to use disease correlation to laboratory findings as a QA tool.	results that are not consistent with patient diagnoses.	have accurately correlated laboratory findings on assigned laboratory activities.	correlate laboratory findings to disease states covered in the course.	needed at this time.
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: Unit 1 test contains questions to include professional behavior.	Measure 1:Students must pass the test with a score of at least 80%.	Measure 1: All students with passing grades scored at least 80% on the test.	Measure 1: All students with passing scores have an introductory understanding of professional behavior.	Measure 1: Findings indicate no changes are needed at this time.
	Measure 2: Adherence to proper laboratory dress code and common regulatory requirements (i.e. HIPPA)	Measure 2: Students must comply with dress code requirements for safety and HIPPA requirements.	Measure 2: All students with passing grades properly gowned laboratory clothing (i.e. lab coat) and showed compliance to HIPPA regulations	Measure 2: All students with passing grades are aware of proper laboratory attire and HIPPA regulations that are discussed.	Measure 2: Findings indicate no changes are needed at this time.

Evidence of Learning: MLS 2211					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
			they were exposed to.		
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the program and in the laboratory	Measure 1: Laboratory exercises require students to communicate critical values to the healthcare provider.	Measure 1: All students must accurately identify all critical values and properly report them to the provider.	Measure 1: All students with passing grades were able to identify critical values.	Measure 1: All students with passing grades know the importance of prompt and professional interaction.	Measure 1: Findings indicate no changes are needed at this time.
	Measure 2: Instructor/ Professor observation of interactions amongst peers.	Measure 2: All students must adhere to the no hazing policy outlined in the course syllabus.	Measure 2: All students with a passing grade have interacted appropriately with their colleagues.	Measure 2: All students with passing grades know the importance of prompt and professional interaction.	Measure 2: Findings indicate no changes are needed at this time.

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.
** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing.

Summary: MLS 2211 is an introductory clinical chemistry course covering the theory and principles of clinical chemistry, including laboratory math, basic instrumentation, carbohydrates, lipids, electrolytes, and acid-base balance. MLS 2211 contains all of the eight identified learning goals. The exposure level of each goal in this course is appropriate for the introductory students.

Evidence of Learning: Courses within the Major: MLS 2213 Principles of Clinical Chemistry II

Evidence of Learning: MLS 2213					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.	Measure 1: Each exam covers testing specific to the covered units.	Measure 1: Each student must complete the exam with a score of at least 80%.	Measure 1: All students with passing grades achieved a score of at least 80% on each unit exam.	Measure 1: All students with passing grades showed an acceptable level of understanding of the theory behind the testing discussed.	Measure 1: Findings indicate no changes are needed at this time.
	Measure 2: Students will complete laboratory exercises, which require understanding of the testing methods.	Measure 2: The total points earned from the laboratory must equal at least 80% of the points possible.	Measure 2: All students with passing grades earned at least 80% of the total points possible.	Measure 2: All students with passing grades showed competency of the covered topics and laboratory exercises.	Measure 2: Findings indicate no changes are needed at this time.
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	Measure 1: Students must complete a 40-question lab math exam before beginning lab work. Questions	Measure 1: Each student must pass the exam with a score of at least 80%.	Measure 1: All students with passing grades scored at least 80%.	Measure 1: All students with a passing grade can successfully complete laboratory mathematics.	Measure 1: Instituted review questions in all subsequent examinations

Evidence of Learning: MLS 2213					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	are repeated throughout the year to help students remember			Continual exposure to math throughout the year, assists with memory.	
	Measure 2: Graded laboratory exercises, which include calculations.	Measure 2: All students must correctly complete laboratory calculations.	Measure 2: All students with passing grades earned at least 80% of the total points possible.	Measure 2: All students with passing grades can successfully complete laboratory mathematics.	Measure 2: Findings indicate no changes are needed at this time.
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.	Measure 1: Students will complete a laboratory final with several exercises ranging in difficulty.	Measure 1: All students must complete the laboratory final with a score of at least 80%.	Measure 1: All students with passing grades earned a score of at least 80%.	Measure 1: All students with passing grades can successfully complete laboratory testing procedures ranging in difficulty.	Measure 1: Findings indicate no changes are needed at this time.
	Measure 2: Demonstrate knowledge of accurate sample requirements and collection procedures.	Measure 2: Students will assess samples submitted for testing for acceptability.	Measure 2: All students with passing grades have accurately demonstrated knowledge of sample requirements.	Measure 2: All students can assess samples for testing as appropriate.	Measure 2: Instituted clinical correlation exercises which deal with patient pathologies and specimen issues in testing to better

Evidence of Learning: MLS 2213					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
					inform the students regarding sample requirements and collection procedures
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: Students will correlate theory and terminology in all laboratory exercises.	Measure 1: Students will complete all laboratory correlation activities with a score of at least 80%.	Measure 1: All students with passing grades earned a score of at least 80%.	Measure 1: All students with passing grades can correlate theory to practical laboratory situations.	Measure 1: Findings indicate no changes are needed at this time.
	Measure 2: Students must test unknown samples during laboratory exercises.	Measure 2: Students must complete the laboratory section with at least 80%.	Measure 2: All students with passing grades earned a score of at least 80%.	Measure 2: All students with passing grades can correlate theory to laboratory situations.	Measure 2: Findings indicate no changes are needed at this time.
Learning Outcome 5: Gather additional laboratory data and apply problem solving skills to solve problems/discrepancies.	Measure 1: Students must gather all applicable data regarding the patient and use it	Measure 1: Students must obtain all pertinent information which is scored on their laboratory section,	Measure 1: All students with passing grades earned a score of at least 80%	Measure 1: All students with passing grades can gather laboratory data and use it to solve problems and discrepancies	Measure 1: Instituted QC labs prior to the introduction of a new test. Also instituted a Levy-

Evidence of Learning: MLS 2213					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	for a tentative diagnosis	which must be at least 80%			Jennings problem-solving worksheet
	Measure 2: Most laboratory activities require the students to troubleshoot specimen/result discrepancies.	Measure 2: All Students must correct discrepancies in order to report out correct results with at least 80% accuracy.	Measure 2: All students with passing grades earned a score of at least 80%.	Measure 2: All students with passing grades are able to identify and correct discrepancies in order to provide accurate results.	Measure 2: Findings indicate no changes are needed at this time.
Learning Outcome 6: Relate laboratory findings to common disease.	Measure 1: Each unit exam will test the student's ability to correlate laboratory findings to common diseases.	Measure 1: Each student must pass the exam with a score of at least 80%.	Measure 1: All students with passing grades earned a score of at least 80%.	Measure 1: All students with passing grades can accurately correlate laboratory findings to common diseases.	Measure 1: Findings indicate no changes are needed at this time.
	Measure 2: Laboratory exercises require students to use disease correlation to laboratory findings as a QA tool.	Measure 2: Students must identify laboratory results that are not consistent with patient diagnoses.	Measure 2: All students with passing grades have accurately correlated laboratory findings on assigned	Measure 2: All students with passing grades can correlate laboratory findings to disease states covered in the course.	Measure 2: Findings indicate no changes are needed at this time.

Evidence of Learning: MLS 2213					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
			laboratory activities.		
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: The final exam contains questions that cover professional behavior.	Measure 1:Students must pass the test with a score of at least 80%.	Measure 1: All students with passing grades scored at least 80% on the test.	Measure 1: All students with passing scores have an introductory understanding of professional behavior.	Measure 1: Findings indicate no changes are needed at this time.
	Measure 2: Adherence to proper laboratory dress code and common regulatory requirements (i.e. HIPAA)	Measure 2: Students must comply with dress code requirements for safety and HIPAA requirements.	Measure 2: All students with passing grades properly gowned laboratory clothing (i.e. lab coat) and showed compliance to HIPAA regulations they were exposed to.	Measure 2: All students with passing grades are aware of proper laboratory attire and HIPAA regulations that are discussed.	Measure 2: Findings indicate no changes are needed at this time.
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the	Measure 1: Laboratory exercises require students to communicate	Measure 1: All students must accurately identify all critical values and properly report	Measure 1: All students with passing grades were able to	Measure 1: All students with passing grades know the importance of	Measure 1: Findings indicate no changes are needed at this time.

Evidence of Learning: MLS 2213					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
program and in the laboratory	critical values to the healthcare provider.	them to the provider.	identify critical values.	prompt and professional interaction.	
	Measure 2: Instructor/ Professor observation of interactions amongst peers.	Measure 2: All students must adhere to the no hazing policy outlined in the course syllabus.	Measure 2: All students with a passing grade have interacted appropriately with their colleagues.	Measure 2: All students with passing grades know the importance of prompt and professional interaction.	Measure 2: Findings indicate no changes are needed at this time.

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.
** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing.

Summary: MLS 2213 is the second semester of the introductory clinical chemistry course covering the theory and principles of clinical chemistry, including proteins and non-protein nitrogens, enzymology, endocrinology, therapeutic drug monitoring, toxicology, analytical principles, heme derivatives, and body fluids. MLS 2213 contains all of the eight identified learning goals. The exposure level of each goal in this course is appropriate for the introductory students.

Evidence of Learning: Courses within the Major: MLS 3302 Biostatistics, Research Methods, and Laboratory Practices

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem-solving skills.	Measure 1: Exam three focused on pre-use validation of clinical instrumentation	Measure 1: 100% of students will score at least 80% on this exam	Measure 1: 84% of students scored an 80% or better (range: 58 – 100)	Measure 1: four students did not achieve 80% but upon retake they earned the required 80% grade	Measure 1: No changes are needed to this unit exam
	Measure 2: Problem based practical exam containing a five-part pre-use validation of a new clinical test.	Measure 2: 100% of students will score at least 80% on the practical exam	Measure 2: 100% of students scored an 80% or better (range: 85-100)	Measure 2: All students performed adequately on applying their knowledge in a problem-based assignment	Measure 2: No changes are needed to this unit practical (changes were made to make it easier for students to perform calculations not directly taken from CLSI standard manual)
Learning Outcome 2:	Measure 1: A series of homework assignments (n= 14)	Measure 1: 100% of students will compute and	Measure 1: 100% of students completed all	Measure 1: All students were able to apply common	Measure 1: No changes are needed to these

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Apply mathematical calculations to laboratory situations.	covering; t-Test, F-Test, ANOVA, Chi-Squared Test, Correlation, Reference Ranges, Standard Error of the Mean, Sensitivity, Specificity, Positive Predictive Value, Negative Predictive Value, Accuracy, Precision, Minimum Detection Limit	interpret the findings.	homework assignments and either interpreted their findings correctly or understood where they made an error	laboratory mathematical calculations and understand their results	series of homework assignments
	Measure 2: Two problem based practical exams	Measure 2: 100% of students will score at least 80% on the practical exam	Measure 2: 100% of students scored an 80% or better (range: 83-100)	Measure 2: All students were able to apply mathematical calculations to real laboratory situations	Measure 2: No changes are needed to the two practical exams

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.	This course focuses on advanced application of laboratory mathematical theory, research methods, and financial lab management. As such, there are no 'wet' lab procedures taught or conducted. The students do participate in a computer lab.	NA	NA	NA	NA
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: Three (total= 4) unit examinations focus on theory and application of advanced laboratory practices	Measure 1: 100% of students will score at least 80% on this exam	Measure 1: 84% of students scored an 80% or better (range 58-100) These data were compiled across three examinations regarding the LO4.	Measure 1: 8 students individually did not achieve 80% across on of the three unit exams but upon retake they earned the required 80% grade	Measure 1: No changes are needed for these examinations

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	Measure 2: A series of homework assignment (n=18)	Measure 2: 100% of students will complete the assignment and interpret their findings	Measure 1: 100% of students completed all homework assignments and either interpreted their findings correctly or understood where they made an error	Measure 2: All students were able to apply common laboratory mathematical calculations and understand their results	Measure 2: No changes are needed to these assignments
	Measure 3: Two problem based practical examinations	Measure 3: 100% of students will score at least 80% on the practical exam	Measure 3: 100% of students scored an 80% or better (range: 83-100)	Measure 3: All students were able to apply advanced laboratory theory to practical situations	Measure 3: No changes are needed to these practical exams
Learning Outcome 5: Gather additional laboratory data and apply problem solving skills to solve problems/discrepancies.	Measure 1: One unit problem based practical examination (specifically values on the low end of linear range appeared to be suitable until the examination of bias plots)	Measure 1: 100% of students will score at least 80% on the practical exam	Measure 1: 100% of students scored an 80% or better	Measure 1: All students were able to apply advanced laboratory theory to practical situations	Measure 1: No changes are needed to these practical exams

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 6: Relate laboratory findings to common disease.	Measure 1: Research article critique assignment (students select a primary research article to present to the class, often contain clinically relevant laboratory data and disease characterizations)	Measure 1: 100% of students must demonstrate adequate presentation and written skills to convey critical findings, conclusions, and critiques	Measure 1: 100% of students demonstrated an ability to communicate a critical examination of a primary research article.	Measure 1: All students were able to interpret and explain the crucial methods, results, and conclusions of their selected research article and understand how their laboratory results did or did not lead to the conclusions the authors made.	Measure 1: No changes are needed to this assignment
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	This is a theory and application based course that does not focus or measure professionalism or ethical behavior	NA	NA	NA	NA
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the program and in the laboratory	Measure 1: Research article critique	Measure 1: 100% of students must demonstrate adequate presentation and written skills to convey critical	Measure 1: 100% of students demonstrated an ability to communicate a critical examination of a	Measure 1: All students were able to interpret and explain the crucial methods, results, and conclusions of their selected	Measure 1: No changes are needed to this assignment

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
		findings, conclusions, and critiques	primary research article.	research article and understand how their laboratory results did or did not lead to the conclusions the authors made.	

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.
** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.

Summary: MLS3302: Biostatistics, Research Methods, and Laboratory Practices is a course that covers advanced theory and application of mathematics, research concepts, and financial management practices in the clinical laboratory. This course contains four units that cover; basic statistics, experimental/research study design, critiquing and interpreting of research articles, laboratory instrumentation testing and pre-use validation, and laboratory financial management (healthcare reimbursement, financial cost analysis, laboratory budgets, workload recording, and inventory forecasting). MLS3302 is a focused advanced level course that deals with very specific areas of clinical laboratory operation and theory. As such, it does not contain all eight of the MLS department program goals. The goals that are covered; 1-6 & 8, are covered to a high degree (to the utilization level or higher). These data are collected from a single on campus section in the Fall semester from 2018. This population consisted of a total of 21 students and is typical of the campus cohorts I have taught over the last seven years. I have made learning outcome improvements to the course over the seven years I have taught it; the changes I have mostly relate to improved language used in examinations, improving walkthrough laboratory assignments to better teach students to learn statistical software such as R, and adding periodic quizzes to prepare students for the type of questions I will be asking in each unit. I believe in testing with a variety of multiple choice and written questions, with the written essay questions often giving our students the most difficulty. The ‘labs’ in this course are computer based laboratories lead by the instructor and guided by online walkthroughs that I have created that teach students to: upload a data set, perform basic graphical and statistical procedures, and interpret the results of those procedures with a particular interest in the resolving of issues.

Evidence of Learning: Courses within the Major: MLS 3310 Advanced Immunohematology

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.	Measure 1: A set of 10 multiple choice questions from Exam 1 and Quiz 1	Measure 1: 100% of students will score 80% or better on 10 questions	Measure 1: 100% of students scored 80% or better on 10 questions	Measure 1: All students successfully demonstrated theory underlying laboratory testing	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: 11 graded laboratory practice sessions and 2 practical exams	Measure 2: 100% of students will correctly perform required laboratory skills	Measure 2: 100% of students were able to correctly perform required laboratory skills	Measure 2: All students correctly performed required laboratory skills	Measure 2: No clinical changes needed at this time
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	Measure 1: A set of 20 multiple choice questions from Exams 2 and Final Exam	Measure 1: 100% of students will score 80% or better on 20 questions.	Measure 1: 100% of students scored 80% or better on 20 questions.	Measure 1: All students successfully applied mathematical calculations to laboratory situations.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: 2 graded laboratory applications of laboratory mathematical calculations	Measure 2: 100% of students will correctly perform mathematical calculations in	Measure 2: 100% of students correctly performed mathematical calculations in	Measure 2: All students correctly performed mathematical calculations in	Measure 2: No clinical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
		laboratory situations.	laboratory situations.	laboratory situations.	
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.	Measure 1: A set of 20 multiple choice questions from Exams 1 and 2 related to performance of laboratory procedures, specimen collection and processing, analysis, and QA.	Measure 1: 100% of students will score 80% or better on 20 questions	Measure 1: 96% of students scored 80% or better on 20 questions.	Measure 1: All students successfully demonstrated knowledge of evaluating specimen acceptability and optimal analysis methods.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Demonstrate proper knowledge of specimen criteria in a blood bank laboratory setting.	Measure 2: 100% of students will correctly determine proper sample suitability. Students to perform QC on all blood bank reagents	Measure 2: 100% of students were able to correctly determine proper sample suitability for blood bank analysis. QC results accurate.	Measure 2: All students correctly determined proper sample suitability.	Measure 2: No clinical changes needed at this time
Learning Outcome 4: Correlate laboratory theory and terminology	Measure 1: A set of 20 multiple choice questions	Measure 1: 100% of students will score 80% or better on 20 questions.	Measure 1: 100% of students scored 80% or better on 20 questions	Measure 1: All students successfully correlated	Measure 1: No curricular or pedagogical

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
to practical laboratory work	from Exams 1 and 2.			laboratory theory and terminology to practical laboratory work.	changes needed at this time
	Measure 2: Assess unknowns with accuracy during 2 laboratory practical exams	Measure 2: 100% of students will score 80% or better on 2 laboratory practical exams	Measure 2: 99% of students scored 80% or better on 2 laboratory practical exams.	Measure 2: Most students performed the required skills during the 2 laboratory practical exams.	Measure 2: No clinical changes needed at this time
Learning Outcome 5: Gather additional laboratory data and apply problem-solving skills to solve problems/discrepancies.	Measure 1: A set of 20 multiple choice questions from Exams 2 and 3.	Measure 1: 100% of students will score 80% or better on 20 questions.	Measure 1: 100% of students scored 80% or better on 20 questions.	Measure 1: All students successfully demonstrated problem solving skills	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Students resolve discrepancies in the 11 laboratory sessions and must correlate patient history to laboratory findings	Measure 2: 100% of students will correctly resolve discrepancies in the 11 laboratory sessions and correlate patient history to laboratory findings	Measure 2: 100% of students were able to correctly resolve discrepancies in the 11 laboratory sessions and correlate patient history to laboratory findings	Measure 2: All students correctly resolved discrepancies in the 11 laboratory sessions and correlated patient history to laboratory findings	Measure 2: No clinical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 6: Relate laboratory findings to common disease.	Measure 1: A set of 25 questions from Exams 2, 3, and the Final Exam	Measure 1: 100% of students will score 80% or better on 25 questions.	Measure 1: 100% of students scored 80% or better on 25 questions	Measure 1: All students correctly related laboratory findings to common diseases.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: In 2 laboratory sessions students relate laboratory findings to common diseases	Measure 2: 100% of students will perform the required skills in the laboratory	Measure 2: 100% of students were able to relate laboratory findings to common diseases.	Measure 2: All students correctly related laboratory findings to common diseases.	Measure 2: No clinical changes needed at this time
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: Attendance and punctuality expectations defined in course syllabus	Measure 1: 100% of students will attend laboratory section and be punctual.	Measure 1: 100% attendance in laboratory section. 89% punctuality	Measure 1: All students attended laboratory section and most were punctual	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Adherence to laboratory dress code and safety procedures	Measure 2: 100% of students will comply with dress code and safety procedures.	Measure 2: 100% of students complied with dress code and safety procedures	Measure 2: All students were in compliance with dress code and safety procedures.	Measure 2: No clinical changes needed at this time
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the	Measure 1: 3 Essay questions on exam 3.	Measure 1: 100% of students will score 80% or better on essay questions.	Measure 1: 100% of students were able to communicate their	Measure 1: All students were able to communicate their knowledge on the essay questions	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
program and in the laboratory			knowledge on the essay questions		
	Measure 2: Affective Domain Assessment in laboratory measuring communication skills.	Measure 2: 100% of students will receive "satisfactory" marks on Affective Domain Assessment measuring communication skills.	Measure 2: 100% of students communicate effectively in the group setting	Measure 2: All students can communicate better as the course progresses	Measure 2: No clinical changes needed at this time

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.

** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.

Summary: MLS 3310 is an advanced immunohematology course covering advanced blood banking theory and specialized procedures of immunohematology relevant to blood group serology, antibody detection and identification, compatibility testing, component preparation and therapy in blood transfusion service, quality control, donor screening and phlebotomy, transfusion reactions and hemolytic disease of the fetus and newborn. MLS 3310 contains all eight of the program's identified learning goals, though in appropriately varying amounts. As noted in the curriculum map, learning goals 1, 2, 4, 5, and 8 are areas of utilization, learning goal 6 is emphasized, and learning goals 3 and 7 are assessed comprehensively. In all cases, the measures show that 100% of the students are reaching all 8 goals at levels of 80% or above, so no curricular or clinical changes are seen as needed at this time. Data in this table are derived from five sections of the course taught in fall 2018-2019 by Justin Rhees. This course was previously listed as MLS 3311 and was taught by Bill Zundel and Janet Oja from 2008-2018.

Evidence of Learning: Courses within the Major: MLS 3313 Advanced Hematology and Hemostasis

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem-solving skills.	Measure 1: The Unit 1 exam tests the principles of hematology testing. The Unit 5 exam tests the principles of hemostasis testing. 50 multiple choice questions each.	Measure 1: > 90% of students must score 80% or better on exams, proving competency. If they do not score above 80%, they are required to score well on a retake exam to prove competency.	Measure 1: 95% of students scored 80% or better on both exams.	Measure 1: 95% of students successfully demonstrated theory underlying laboratory testing	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: 11 graded laboratory practice sessions and 2 comprehensive lab practical's.	Measure 2: >90% of Students are required to score above an 80% in laboratory skills and competencies.	Measure 2: 100% of students were able to correctly perform required laboratory skills	Measure 2: All students correctly performed required laboratory skills	Measure 2: No clinical changes needed at this time
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	Measure 1: Many multiple-choice questions requiring mathematical calculations in exam 1, 2 and 5	Measure 1: >90% of students will score 80% or better on these questions.	Measure 1: 95% of students scored 80% or better on 8 questions.	Measure 1: 95% of students successfully applied mathematical calculations to	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
				laboratory situations.	
	Measure 2: Laboratory sessions requiring applications of laboratory mathematical calculations	Measure 2: >90% of students will correctly perform mathematical calculations in laboratory situations.	Measure 2: 100% of students correctly performed mathematical calculations in laboratory situations.	Measure 2: 100% of students correctly performed mathematical calculations in laboratory situations.	Measure 2: No clinical changes needed at this time
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.	Measure 1: 50 multiple choice questions from Exam 1 and 10 multiple choice questions from Exam 5	Measure 1: >90% of students will score >80% on 60 questions	Measure 1: 95% of students scored 80% or better on 20 questions.	Measure 1: 95% of students successfully demonstrated knowledge of evaluating specimen acceptability and optimal analysis methods.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Demonstrate proper knowledge of specimen criteria in a hematology laboratory setting	Measure 2: >90% of students will correctly determine proper sample suitability.	Measure 2: >95% of students were able to correctly determine proper sample suitability for hematology analysis	Measure 2: All students correctly determined proper sample suitability.	Measure 2: No clinical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: 50 multiple choice questions each from exams 2, 3, and 4	Measure 1: >90% of students will score 80% or better on all questions.	Measure 1: >95% of students scored 80% or better on 20 questions	Measure 1: >95% of students successfully correlated laboratory theory and terminology to practical laboratory work.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Evaluate abnormal hematology smears from a wide variety of disorders during 6 laboratory sessions. Assess competency during 1 laboratory practical exam	Measure 2: >90% of students will score 80% or better on the laboratory practical exam and participate in all required laboratory sessions.	Measure 2: >95% of students scored 80% or better on the laboratory practical exam and participated in all required laboratory sessions.	Measure 2: >95% of students performed the required skills during the laboratory practical exam and required laboratory sessions.	Measure 2: No clinical changes needed at this time
Learning Outcome 5: Gather additional laboratory data and apply problem solving skills to solve problems/discrepancies.	Measure 1: A set of 15 multiple choice questions from Exams 1 and 5	Measure 1: >90% of students will score 80% or better on 20 questions.	Measure 1: >95% of students scored 80% or better on 20 questions.	Measure 1: >95% of students successfully demonstrated problem solving skills	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	Measure 2: Students correlate patient history and diagnoses to laboratory findings in 6 laboratory sessions	Measure 2: >90% of students will correctly correlate patient history and diagnoses to laboratory findings in 6 laboratory sessions	Measure 2: >95% of students were able to correctly correlate patient history and diagnoses to laboratory findings in 6 laboratory sessions	Measure 2: >95% of students correctly correlated patient history and diagnoses to laboratory findings in 6 laboratory sessions	Measure 2: No clinical changes needed at this time
Learning Outcome 6: Relate laboratory findings to common disease.	Measure 1: 50 multiple choice questions each from exams 2, 3, and 4, and 25 questions from exam 5.	Measure 1: >90% of students will score 80% or better on 50 multiple choice questions each from exams 2, 3, and 4, and 25 questions from exam 5.	Measure 1: >95% of students scored 80% or better on 50 multiple choice questions each from exams 2, 3, and 4, and 25 questions from exam 5.	Measure 1: >95% of students correctly related laboratory findings to common diseases.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: In 6 laboratory sessions students relate laboratory findings to common diseases	Measure 2: >90% of students will perform the required skills in the laboratory	Measure 2: 100% of students were able to relate laboratory findings to common diseases.	Measure 2: >95% of students correctly related laboratory findings to common diseases.	Measure 2: No clinical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: Attendance and punctuality expectations defined in course syllabus	Measure 1: >95% of students will attend laboratory section and be punctual.	Measure 1: 100% attendance in laboratory section. >95% punctuality	Measure 1: >95% of students attended laboratory section and most were punctual	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Adherence to laboratory dress code and safety procedures	Measure 2: >95% of students will comply with dress code and safety procedures.	Measure 2: 100% of students complied with dress code and safety procedures	Measure 2: >95% of students were in compliance with dress code and safety procedures.	Measure 2: No clinical changes needed at this time
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the program and in the laboratory	Measure 1: Laboratory etiquette and expectations are defined in the syllabus. Measured by punctuality and participation.	Measure 1: >95% of students will be punctual to laboratory sessions, and remain task-oriented throughout the session in order to receive full participation credit.	Measure 1: >95% of students were punctual to laboratory sessions, and remained task-oriented throughout the session and received full participation credit.	Measure 1: >95% of students demonstrated effective communication skills through punctuality and tasks during laboratory sessions.	Measure 1: No curricular or pedagogical changes needed at this time

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.

** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.

Summary: MLS 3313 is an Advanced Hematology course covering:

- Hematology and hemostasis relevant to routine laboratory testing
- Normal erythrocyte physiology and abnormal erythrocyte associated disorders
- Normal leukocyte physiology and abnormal leukocyte associated non-malignant and malignant blood disorders
- Normal platelet and coagulation physiology and associated disorders.

MLS 3313 contains all eight of the program's identified learning goals in varying amounts. As noted in the curriculum map, learning goals 5 and 8 are areas of introduction, learning goals 1 and 3 are emphasized, and learning goals 2, 4, 6, and 7 are utilized.

Evidence of Learning: Courses within the Major: MLS 3314

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.	Measure 1: Each exam covers testing specific to the covered units.	Measure 1: Each student must complete the exam with a score of at least 80%.	Measure 1: All students with passing grades achieved a score of at least 80% on each unit exam.	Measure 1: All students with passing grades showed an acceptable level of understanding of the theory behind the testing discussed.	Measure 1: Findings indicate no changes are needed at this time.
	Measure 2: Students will complete laboratory exercises, which require understanding of the testing methods.	Measure 2: The total points earned from the laboratory must equal at least 80% of the points possible.	Measure 2: All students with passing grades earned at least 80% of the total points possible.	Measure 2: All students with passing grades showed competency of the covered topics and laboratory exercises.	Measure 2: Findings indicate no changes are needed at this time.
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	Measure 1: Multiple exams include questions covering reactions specific to that unit.	Measure 1: Each student must pass the exam with a score of at least 80%.	Measure 1: All students with passing grades scored at least 80%.	Measure 1: All students with a passing grade can successfully complete	Measure 1: Findings indicate no changes are needed at this time.

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
				laboratory mathematics.	
	Measure 2: Graded laboratory exercises, which include calculations.	Measure 2: All students must correctly complete laboratory calculations.	Measure 2: All students with passing grades earned at least 80% of the total points possible.	Measure 2: All students with passing grades can successfully complete laboratory mathematics.	Measure 2: Findings indicate no changes are needed at this time.
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, *(CONT)* interpretation, and use of quality assurance procedures.	Measure 1: Students will complete a laboratory project that includes several exercises ranging in difficulty.	Measure 1: All students must complete the laboratory with a score of at least 80%.	Measure 1: All students with passing grades earned a score of at least 80%.	Measure 1: All students with passing grades can successfully complete laboratory testing procedures ranging in difficulty.	Measure 1: Findings indicate no changes are needed at this time.
	Measure 2: Demonstrate knowledge of accurate sample requirements and collection procedures.	Measure 2: Students will assess samples submitted for testing for acceptability.	Measure 2: All students with passing grades have accurately demonstrated knowledge of sample requirements.	Measure 2: All students can assess samples for testing as appropriate.	Measure 2: Findings indicate no changes are needed at this time.

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: Students will correlate theory and terminology in all laboratory exercises.	Measure 1: Students will complete all laboratory correlation activities with a score of at least 80%.	Measure 1: All students with passing grades earned a score of at least 80%.	Measure 1: All students with passing grades can correlate theory to practical laboratory situations.	Measure 1: Findings indicate no changes are needed at this time.
	Measure 2: Students must complete the verification exercise that requires knowledge of theory.	Measure 2: Students must complete the verification with at least 80%.	Measure 2: All students with passing grades earned a score of at least 80%.	Measure 2: All students with passing grades can correlate theory to laboratory situations.	Measure 2: Findings indicate no changes are needed at this time.
Learning Outcome 5: Gather additional laboratory data and apply problem solving skills to solve problems/discrepancies.	Measure 1: Students will evaluate a collection of tests to identify discrepancies.	Measure 1: All students must pass the panel exam with at least 80%.	Measure 1: All students with passing grades earned a score of at least 80%.	Measure 1: All students with passing grades are able to correlate multiple results for the identification of erroneous entries.	Measure 1: Findings indicate no changes are needed at this time.

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	Measure 2: The laboratory verification exercise will require the students to troubleshoot multiple situations.	Measure 2: All Students must correct discrepancies in order to report out verification results with at least 80% accuracy.	Measure 2: All students with passing grades earned a score of at least 80%.	Measure 2: All students with passing grades are able to identify and correct discrepancies in order to provide accurate results.	Measure 2: Findings indicate no changes are needed at this time.
Learning Outcome 6: Relate laboratory findings to common disease.	Measure 1: Each unit exam will test the student's ability to correlate laboratory findings to common diseases.	Measure 1: Each student must pass the exam with a score of at least 80%.	Measure 1: All students with passing grades earned a score of at least 80%.	Measure 1: All students with passing grades can accurately correlate laboratory findings to common diseases.	Measure 1: Findings indicate no changes are needed at this time.
(CONT)	Measure 2: Class assignments will require the students to understand disease states in order to determine if the results are acceptable.	Measure 2: Students must identify laboratory results that are not consistent with patient diagnoses.	Measure 2: All students with passing grades have accurately correlated laboratory findings on assigned activities.	Measure 2: All students with passing grades can correlate laboratory findings to disease states covered in the course.	Measure 2: Findings indicate no changes are needed at this time.
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: The final exam contains 30 questions that	Measure 1:Students must pass the test with a	Measure 1: All students with passing grades	Measure 1: All students with passing scores have an introductory	Measure 1: Findings indicate no changes are

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	cover professional behavior.	score of at least 80%.	scored at least 80% on the test.	understanding of professional behavior.	needed at this time.
	Measure 2: Adherence to proper laboratory dress code and common regulatory requirements (i.e. HIPAA)	Measure 2: Students must comply with dress code requirements for OSHA and HIPAA requirements.	Measure 2: All students with passing grades properly gowned laboratory clothing (i.e. lab coat) and showed compliance to HIPAA regulations they were exposed to.	Measure 2: All students with passing grades are aware of proper laboratory attire and HIPAA regulations that are discussed.	Measure 2: Findings indicate no changes are needed at this time.
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the program and in the laboratory	Measure 1: The verification exercise requires the students to submit a validation plan and an executive summary.	Measure 1: All verification and validation activities but earn a grade of at least 80%.	Measure 1: All students with passing grades earned at least 80% on the verification and validation exercises.	Measure 1: All students with passing grades have shown appropriate written communication skills.	Measure 1: Findings indicate no changes are needed at this time.
	Measure 2: Instructor/ Professor observation of	Measure 2: All students must adhere to the no hazing policy	Measure 2: All students with a passing grade have interacted	Measure 2: All students with passing grades know the importance of	Measure 2: Findings indicate no changes are needed at this time.

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	interactions amongst peers.	outlined in the course syllabus.	appropriately with their colleagues.	prompt and professional interaction.	

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.
** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.

Summary: MLS 3314 is an advanced clinical chemistry course covering the theory and principles of clinical chemistry, including protein catabolism, carbohydrate metabolism, safety, regulatory agencies, non-protein nitrogen compounds, instrumentation validation, electrolyte balance, Lipids, enzymology, therapeutic drug monitoring, toxicology, analytical principles, and endocrinology. MLS 3314 contains all of the eight identified learning goals. The exposure level of each goal in this course is appropriate for the advanced students.

Evidence of Learning: Courses within the Major: MLS 4409

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.	Measure 1: Student participation in physician guided correlation	Measure 1: All students required to attend and participate in discussion	Measure 1: All students participate in discussion	Measure 1: Student participation increases as semester progresses	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: None	Measure 2: None	Measure 2: None	Measure 2: None	Measure 2: No clinical changes needed at this time
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2N/A	Measure 2: No clinical changes needed at this time
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1N/A	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
and processing, analysis, interpretation, and use of quality assurance procedures.	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: No clinical changes needed at this time
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: Students must view pre-recorded lectures and take a quiz each week***	Measure 1: The threshold for evidence of student learning is 80% for the overall quiz grade***	Measure 1: This course serves as a capstone to link the previously-learned learning objectives from multiple courses***	Measure 1: Students increase their knowledge and empathy toward patients and disease***	Measure 1: Because of these results, and student preference, more student-directed cases have been presented with a pathologist's guidance
	Measure 2: Students must appropriately present a case that provides a teaching point and include findings from 2 areas of the lab***	Measure 2: The presentation should demonstrate a pathophysiologic mechanisms and testing interferences learned in the program***	Measure 2: This course helps students to link previously learned outcomes and testing interferences with actual pathologies***	Measure 2: Students gain a greater understanding of the application of the didactic knowledge and deeper understanding ***	Measure 2: Emphasis has been placed to ensure that the students teach a practical application of testing during their case

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 5: Gather additional laboratory data and apply problem solving skills to solve problems/discrepancies.	Measure 1: ***	Measure 1: ***	Measure 1: ***	Measure 1: ***	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: ***	Measure 2: ***	Measure 2: ***	Measure 2: ***	Measure 2: No clinical changes needed at this time
Learning Outcome 6: Relate laboratory findings to common disease.	Measure 1: Students must take a quiz on the weekly lecture video***	Measure 1: The threshold for evidence of student learning is 80% for the overall quiz grade***	Measure 1: This course serves as a capstone to link the previously-learned learning objectives from multiple courses ***	Measure 1: Students can easily correlate their laboratory findings with disease states***	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: ***	Measure 2: ***	Measure 2: ***	Measure 2: ***	Measure 2: No clinical changes needed at this time
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: Attendance and punctuality expectations defined in course syllabus	Measure 1: 100% of students will attend and be punctual.	Measure 1: 95% punctuality	Measure 1: Most students were punctual	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	Measure 2: Observation of an educational case presentation***	Measure 2: Presenting an educational case to the class***	Measure 2: A requirement in the presentation assignment is to include 2 different areas of the lab that give practical application***	Measure 2: Students gained confidence in their presentation skills and clinicopathologic correlation***	Measure 2: No clinical changes needed at this time
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the program and in the laboratory	Measure 1: Observation of conveyance of appropriate knowledge***	Measure 1: Effectively shared appropriate knowledge with the class***	Measure 1: Inclusion of 2 previously learned learning outcomes from 2 sections of the lab is required***	Measure 1: Students gain appropriate knowledge when presenting cases***	Measure 1: Began having students present cases for their learning
	Measure 2: ***	Measure 2: ***	Measure 2: ***	Measure 2: ***	Measure 2: No curricular or pedagogical changes needed at this time

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.

** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.

*** This course is a 1 credit hour course. Case studies are presented and discussed with the students and correlations between laboratory data and patient diagnosis are evaluated. Dr. Moore will route the discussions to achieve the course objectives.

Summary: MLS 4409 - Clinical Correlation. This course is a 1 credit hour course which discusses correlations between laboratory data, patient diagnoses, and how it affects their lives. Dr. Scott Moore, a pathologist and Assistant Professor at Weber State Univeristy, presents cases and has physicians from the community visit occasionally to give their perspectives on patient care. During class time, the students begin by presenting an introductory case study, and work up to presenting full case studies of their choosing as a final project. The students are also assigned each week to watch one recorded lecture at home and take a quiz. This has been taught by Dr. Scott Moore since fall of 2017.

Evidence of Learning: Courses within the Major: MLS 4410 Interdisciplinary Healthcare Teams

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.	Measure 1: Student will correctly correlate laboratory data with the patient's clinical condition in case study presentation.	Measure 1: 100% of students will correctly correlate laboratory data with the patient's clinical condition.	Measure 1: 100% of students were able to correctly correlate the laboratory data with the patient's clinical condition.	Measure 1: All students correctly correlated the laboratory data with the patient's clinical condition.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Student will correctly correlate the laboratory data with the patient's clinical condition in the interprofessional simulation activity.	Measure 2: 100% of students will correctly correlate laboratory data with the patient's clinical condition.	Measure 2: 100% of students were able to correctly correlate the laboratory data with the patient's clinical condition.	Measure 2: All students correctly correlated the laboratory data with the patient's clinical condition.	Measure 2: No clinical changes needed at this time
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	Measure 1: Student will correctly correlate perform mathematical calculations in case study presentation and in	Measure 1: 100% of students will correctly perform mathematical calculations in case study presentation and in	Measure 1: 100% of students correctly performed mathematical calculations in case study presentation and in	Measure 1: All students successfully applied mathematical calculations in case study presentation and in	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	interprofessional simulation.	interprofessional simulation.	interprofessional simulation.	interprofessional simulation.	
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.	Not Applicable (This course does not have a laboratory component.)	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: Students will accurately correlate laboratory theory and utilize the terminology to solve multidisciplinary case studies.	Measure 1: Students will solve the multidisciplinary case studies by applying knowledge of laboratory theory and terminology with 100% accuracy.	Measure 1: Students solved the multidisciplinary case studies with 100% accuracy.	Measure 1: All students successfully correlated laboratory theory and terminology to the practical laboratory work presented in the multidisciplinary case study.	Measure 1: No curricular or pedagogical changes needed at this time
Learning Outcome 5: Gather additional laboratory data and apply problem-solving	Measure 1: Students will work in groups to brainstorm additional	Measure 1: Students will correctly identify additional laboratory data	Measure 1: Students solved the multidisciplinary case studies with 100% accuracy.	Measure 1: All students successfully identified additional	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
skills to solve problems/discrepancies.	laboratory data required to correctly solve the multidisciplinary case studies.	required to correctly solve the multidisciplinary case studies.		laboratory data required and demonstrated problem solving skills necessary to resolve the multidisciplinary case studies.	
Learning Outcome 6: Relate laboratory findings to common disease.	Measure 1: Students relate laboratory findings to common diseases in the multidisciplinary case study and simulated interprofessional education (IPE) activity.	Measure 1: Students will relate laboratory findings to the disease states presented in the case study and IPE activity with 100% accuracy.	Measure 1: 100% of students were able to relate laboratory findings to common diseases.	Measure 1: All students correctly related laboratory findings to common diseases.	Measure 1: No clinical changes needed at this time
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: Attendance, punctuality, and professional/ethical expectations defined in course syllabus	Measure 1: Students will attend regular course offerings, be punctual, and demonstrate professional/ ethical behavior	Measure 1: Students attended regular course offerings with >90% attendance and punctuality. No issues related to unprofessional	Measure 1: All students attended the sessions with >90% attendance and most were punctual	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
		while interacting with fellow students.	behavior/ lack of ethics were noted during lectures, group work, and/or IPE activities.		
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the program and in the laboratory	Measure 1: Students demonstrate effective communication skills and behaviors while they interview a member from a different allied healthcare program.	Measure 1: All students will demonstrate effective communication skills while conducting the interview.	Measure 1: 100% of students were able to communicate effectively and professionally during the interview.	Measure 1: All students were able to demonstrate effective communication skills and behaviors with their colleagues within the program.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Students demonstrate effective communication skills and behaviors while they work in teams to solve case studies and participate in a	Measure 2: All students will demonstrate effective communication skills while working on the case studies and within their role in	Measure 2: 100% of students demonstrated effective communication skills while working in groups on the case studies and within their role in the	Measure 2: All students were able to demonstrate effective communication skills and behaviors with their colleagues within the program.	Measure 2: No changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	simulated IPE activity.	the simulated IPE activity.	simulated IPE activity.		

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.
** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.

Summary: MLS 4410 is a course covering the theory and principles of interdisciplinary teamwork within the healthcare setting. This course provides an interdisciplinary experience with the team concept as a priority. Students learn the roles and responsibilities of various healthcare professionals. The course teaches students to practice an interdisciplinary approach as they research, interact, and learn in the interdisciplinary environment of a healthcare setting. MLS 4410 contains seven of the program's identified learning goals, though in appropriately varying amounts. As noted in the curriculum map, learning 1, 2, and 4 are utilized, 5 and 6 are emphasized, and 7 and 8 are comprehensively assessed. Learning goal 3 is not applicable to this course. In all cases, the measures show that 100% of the students are reaching all 7 goals at levels of 80% or above, so no curricular or clinical changes are seen as needed at this time. Data in this table are derived from five sections of the course taught in spring 2019 by Justin Rhees. Prior to spring, 2019, MLS 4410 was taught by Janet Oja.

Evidence of Learning: Courses within the Major: MLS 4803 Research Projects in MLS

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.	Measure 1: Student research groups develop a research question / hypothesis related to MLS and write a grant detailing the experimentation needed to test their hypothesis.	Measure 1: 100% of student groups will develop a research question relating to MLS and also develop methods to address the research question	Measure 1: 100% of student groups developed a research question relating to MLS and also developed methods to address the research question	Measure 1: All students were able to define a clear hypothesis and outline a research proposal for the next year detailing their experimental approaches and expected results.	Measure 1: No curricular or pedagogical changes needed at this time; however we are always critiquing the grants produced by the students to improve the likelihood of obtaining funding.
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	Measure 1: Student groups identify appropriate statistical calculations to be used in analyzing data to be collected.	Measure 1: 100% of student groups will identify appropriate statistical calculations to be used in analyzing data to be collected.	Measure 1: 100% of student groups identified appropriate statistical calculations to be used in analyzing data to be collected.	Measure 1: The students have achieved the learning outcome by defining the statistical calculations they intend to use.	Measure 1: No curricular or pedagogical changes needed at this time
Learning Outcome 3: Perform laboratory procedures from simple	Goal not applicable to research class this	NA	NA	NA	NA

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.	semester because it is focuses on generating a hypothesis, writing a research grant, and obtaining funding for experimentation in the following semester.				
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: During the process of developing the research methods, students will correlate laboratory theory and terminology to determine what testing is required to test their hypothesis	Measure 1: 100% of students will correlate laboratory theory and terminology to determine the appropriate tests/methodologies required to experimentally test their hypothesis.	Measure 1: 100% of students correlated laboratory theory and terminology to determine the appropriate experimental methodologies to use in their research plan.	Measure 1: The students were able draw on their knowledge of the clinical laboratory and describe detailed methods to test their hypothesis.	Measure 1: No curricular or pedagogical changes needed at this time
Learning Outcome 5: Gather additional laboratory data and apply problem solving	Goal not applicable to this research-based course	NA	NA	NA	NA

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
skills to solve problems/discrepancies.					
Learning Outcome 6: Relate laboratory findings to common disease.	Goal not applicable to this research-based course	NA	NA	NA	NA
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: Attendance and punctuality expectations defined in course syllabus	Measure 1: 100% of students will attend class and be punctual.	Measure 1: 95% attendance in class	Measure 1: Most students attended class each week, a few had excuses absences	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Obtain CITI certification in Institutional Review Board (IRB) training	Measure 2: 100% of students will achieve at least an 80% on the seven CITI training modules for IRB certification	Measure 2: 100% of students achieved CITI IRB certification	Measure 2: All students were able to pass the seven training modules and earn the CITI certification	Measure 2: No clinical changes needed at this time
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the	Measure 1: 7 course group assignments demonstrating writing proficiency (e.g. abstract, grant	Measure 1: 100% of student groups will demonstrate writing proficiency with scores above 80% or better by	Measure 1: 100% of students scored better than 80% on written group assignments	Measure 1: All student groups were able to demonstrate writing proficiency and that they could	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
program and in the laboratory	proposal, methods, budget sheet)	following directions and format (e.g. abstract and grant guidelines)		adequately communicate their hypothesis, methodological approach, and budget justifications	
	Measure 2: demonstrates effective communication and collaboration within research group and with research mentor	Measure 2: 100 % of students will demonstrate effective communication and collaboration within research group and with research mentor	Measure 2: 93% of students demonstrated effective communication and collaboration within research group and with research mentor	Measure 2: Most students were able to effectively communicate in a collaborative fashion within their research group and with mentor; one student did have an unresolvable conflict with their group and needed to be removed from the project.	Measure 2: No curricular or pedagogical changes needed at this time

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.

** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.

Summary: MLS 4803 – Research Projects in MLS is the first in a series of two courses that span over a single academic year. These data presented are from the most recent campus semester taught, Fall 2018. Students in this course will be guided by the instructor/research mentor through developing a hypothesis, obtaining grant support, experimentation, analysis, and dissemination of their research over an entire year. The first course focuses on developing an independent research question, hypothesis/es that can potentially answer this question, and specific aims to test their hypothesis/es. Over the course of the first semester, students write an abstract, a 7-8 page research proposal outlining their research plan for the coming year, obtain CITI certified IRB training, and apply for project and travel funding for the Spring semester.

Evidence of Learning: Courses within the Major: MLS 4804 Research Projects in MLS II

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.	Measure 1: Student groups will perform experimentation outlined in the Fall proposals to test their main hypothesis/es	Measure 1: 100% of student groups will conduct experimental objectives to successfully test their main hypothesis/es by the March presentation & dissemination deadline	Measure 1: 100% of student groups were able to complete their experimental goals by the March presentation & dissemination deadline	Measure 1: All the student groups were able to optimize and perform the myriad of experimental methods outlined in their research proposals	Measure 1: No changes are required, but even with success every group meets challenges or obstacles to performing their experiments that must be problem-solved in the time allotted
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	Measure 1: Student groups will perform various laboratory mathematical calculations to setup and carry out their experiments (e.g. buffers, reagents, standard curves, etc.)	Measure 1: 100% of student groups will successfully perform the calculations required to achieve their research objectives	Measure 1: 100% of student groups were able to perform the various calculations required to perform their experiments (e.g. make buffers, reagents, standard curves, etc.)	Measure 1: All groups were able to perform the appropriate set of calculations to setup, perform, and analyze their experiments	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Statistical analysis	Measure 2: 100% of student groups	Measure 2: 100% of student groups	Measure 2: Each student group was	Measure 2: No curricular or

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	will be applied to data collected for hypothesis testing (e.g. t-tests, ANOVA, linear regression, etc.)	will be able to apply the appropriate statistical test to formally assess their data and test their hypothesis/es	were able to apply formal statistical tests to asses and analyze their experimental data	able to apply a unique set of statistical tests appropriate for their project data and hypothesis/es	pedagogical changes needed at this time
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.	Measure 1: Preform laboratory testing of identified research methods to address research question, if appropriate for research project	Measure 1: 100% of laboratory testing will be completed for the identified research methods to address the identified research methods to test hypothesis/es	Measure 1: 100% of laboratory testing was completed for the identified research methods to address the identified research methods to test hypothesis/es	Measure 1: 100% of student groups were able to complete laboratory testing for the identified research methods to test hypothesis/es	Measure 1: No curricular or pedagogical changes needed at this time
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	This outcome is not applicable to this research-based course.	NA	NA	NA	NA
Learning Outcome 5: Gather additional laboratory data and apply problem solving	Measure 1: Students will evaluate each set of experimental results and modify	Measure 1: 100% of students will evaluate each set of experimental results and modify	Measure 1: 100% of students were able to evaluate each set of experimental	Measure 1: Every research group encountered obstacles or errors that required	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
skills to solve problems/discrepancies.	methods/procedures to ensure successful experimentation	methods/procedures to ensure successful experimentation	results and modify methods/procedures to ensure successful experimentation	troubleshooting or optimizing their protocols	
Learning Outcome 6: Relate laboratory findings to common disease.	Measure 1: If appropriate to research question or hypothesis, students will relate research findings to common disease	Measure 1: 100% of students will relate research findings to common disease, if appropriate for research project	Measure 1: 100% of students related research findings to common disease, if appropriate for research project	Measure 1: When applicable, the students were able to relate the data they collected to specific disease states	Measure 1: No curricular or pedagogical changes needed at this time
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: Attendance and punctuality expectations defined in course syllabus and research contract between students	Measure 1:100% of students will attend class and lab sections to complete their experiments on time	Measure 1: 100% of the student groups attended the designated class and lab sections, as well as complete their experimentation on time	Measure 1: Perform, analyzing, and disseminating their research in one semester is a challenge, having the students stick to a schedule helps ensure completion.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Present their research to professionals at various local and	Measure 2: 100% of the student groups will submit abstracts and be	Measure 2: 100% of the student groups were able to submit abstracts and be accepted for	Measure 2: All of the research groups presented their posters at a University	Measure 2: No curricular or pedagogical changes needed at this time

Evidence of Learning: Courses within the Major					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	national conferences	accepted for a poster presentation	a poster presentation	research symposium and a local medical society meeting, along with select groups presenting at one of two national professional meetings	
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the program and in the laboratory	Measure 1: 3 course group assignments demonstrating writing proficiency	Measure 1: 100% of student groups will demonstrate writing proficiency on 3 assignments with scores above 80% or better	Measure 1: 100% of students scored better than 80% on written group assignments	Measure 1: All student groups were able to demonstrate writing proficiency on groups assignments	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Demonstration of effective communication and collaboration within research group and with research mentor	Measure 2: 100 % of students will demonstrate effective communication and collaboration within research group and with research mentor	Measure 2: 93% of students demonstrated effective communication and collaboration within research group and with research mentor	Measure 2: Most students were able to effectively communicate in a collaborative fashion within their research group and with mentor	Measure 2: No curricular or pedagogical changes needed at this time

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.
** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.

Summary: MLS 4804 – Research Projects in MLS II. This course is a continuation of MLS 4803. Students will continue working on their original research project that was outlined in the Fall semester. After completing the project, students will present their research findings in poster and oral formats, along with preparing a formal manuscript for publication in the university undergraduate research journal ERGO and possibly in other appropriate scientific journals. The data presented are from the most recent completed semester Spring 2019.

Evidence of Learning: Courses within the Major: MLS 4411 Simulated Laboratory I

Evidence of Learning: MLS 4411					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.	Measure 1: Participation in Simulated Lab Sessions	Measure 1: 100% of students will participate in simulated lab sessions and apply knowledge learned in the MLT program	Measure 1: N/A	Measure 1: N/A	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Recognition of critical values	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: No clinical changes needed at this time
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	Measure 1: Students will calculate CBC values from an EDTA clumper patient.	Measure 1: Students rotating through Hematology will calculate CBC values from an EDTA clumper patient.	Measure 1: 100% of Students rotating through Hematology will calculate CBC values from an EDTA clumper patient.	Measure 1: All students rotating through Hematology will calculate CBC values from an EDTA clumper patient.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2N/A	Measure 2: No clinical changes needed at this time
Learning Outcome 3: Perform laboratory procedures from simple	Measure 1: Rotation through	Measure 1: Students will rotate through each	Measure 1: 100% of students will rotate through each	Measure 1: 100% of students rotated through each	Measure 1: No curricular or pedagogical

Evidence of Learning: MLS 4411					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.	all departments of SIM lab	department: Processing, UA, serology, heme, Coag, Chem, blood bank and micro at least one week during the semester.	department: Processing, UA, serology, heme, Coag, Chem, blood bank and micro at least one week during the semester.	department: Processing, UA, serology, heme, Coag, Chem, blood bank and micro at least one week during the semester.	changes needed at this time
	Measure 2: Weekly sample collection	Measure 2: Students will draw blood each week for a total of 12 blood draws.	Measure 2: 100% of students will draw blood each week for a total of 12 blood draws.	Measure 2: 90% drew blood each week.	Measure 2: No clinical changes needed at this time
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: Students participate in mock CAP inspection	Measure 1: All students will review current CAP standards and prepare a laboratory for inspection	Measure 1: 100% of students participated in mock CAP inspection and submitted a deficiency report to lab manager	Measure 1: All students successfully participated in mock CAP inspection	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Students will calibrate laboratory equipment	Measure 2: All students will calibrate laboratory	Measure 2: 100% of students calibrated laboratory	Measure 2: All students successfully participated in calibration studies	Measure 2: No clinical changes needed at this time

Evidence of Learning: MLS 4411					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
		equipment currently in use	equipment to lab manager standards		
Learning Outcome 5: Gather additional laboratory data and apply problem solving skills to solve problems/discrepancies.	Measure 1: Students will dilute a critical glucose value	Measure 1: Students rotating through chemistry will dilute a critical glucose value	Measure 1: 100% of students rotating through chemistry diluted a critical glucose value	Measure 1: All students rotating through chemistry successfully diluted a critical glucose value	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: NA
Learning Outcome 6: Relate laboratory findings to common disease.	Measure 1: Participation in blood bank SBAR exercise.	Measure 1: Students will participate in a blood bank exercise using the SBAR technique for which they will relate laboratory findings to disease	Measure 1: 100% of Students will participate in a blood bank exercise using the SBAR technique for which they will relate laboratory findings to disease	Measure 1: 100% of participated in a blood bank exercise using the SBAR technique for which they will relate laboratory findings to disease	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: No clinical changes needed at this time

Evidence of Learning: MLS 4411					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: Affective domain rubric assessment of timeliness and professionalism	Measure 1: All students will be assessed using the affective domain rubric and receive the higher acceptable mark.	Measure 1: 100% of students will be assessed using the affective domain rubric and receive the higher acceptable mark.	Measure 1: All students assessed using the affective domain rubric and received the higher acceptable mark.	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Assessment of Telephone skills	Measure 2: All students will be assessed in proper telephone skills.	Measure 2: 100% of students will demonstrate proper telephone skills.	Measure 2: 100% of students demonstrated proper telephone skills.	Measure 2: No clinical changes needed at this time
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the program and in the laboratory	Measure 1: Student functioning as a member of a team	Measure 1: All students will participate in team projects, each taking turns being the project manager	Measure 1: 100% of students participated in team projects, with each taking a turn as project manager	Measure 1: All students participated in and managed the team for all projects	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Evaluation and participation in simulated lab sessions through completion of a manager's	Measure 2: All student managers will report on team members skills and participation in simulated lab sessions.	Measure 2: 100% of student managers will report on team members skills and participation in simulated lab sessions.	Measure 2: All students completed evaluations on team members on team members skills and participation in	Measure 2: No curricular or pedagogical changes needed at this time

Evidence of Learning: MLS 4411					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	checklist in SIM lab.			simulated lab sessions	

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.
** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.
Summary: MLS 4411 – MLS Simulated Laboratory I. This course teaches is a hands-on simulated working laboratory in which students refine technical skills, problem identification and solving, work-load management, and decision-making skills, development of strategies for managing and implementing the rules and regulations that govern medical laboratory testing. Data in this table are derived from five semesters taught fall 2014-2018 by Janet Oja and Janice Thomas

Evidence of Learning: MLS 4412 Simulated Laboratory II					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: No clinical changes needed at this time
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2N/A	Measure 2: No clinical changes needed at this time
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1N/A	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: No clinical changes needed at this time

Evidence of Learning: MLS 4412 Simulated Laboratory II					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: Students participate in mock CAP inspection	Measure 1: All students will review current CAP standards and prepare a laboratory for inspection	Measure 1: 100% of students participated in mock CAP inspection and submitted a deficiency report to lab manager	Measure 1: All students successfully participated in mock CAP inspection	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Students will calibrate laboratory equipment	Measure 2: All students will calibrate laboratory equipment currently in use	Measure 2: 100% of students calibrated laboratory equipment to lab manager standards	Measure 2: All students successfully participated in calibration studies	Measure 2: No clinical changes needed at this time
Learning Outcome 5: Gather additional laboratory data and apply problem solving skills to solve problems/discrepancies.	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: No clinical changes needed at this time
Learning Outcome 6:	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: No curricular or pedagogical

Evidence of Learning: MLS 4412 Simulated Laboratory II					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Relate laboratory findings to common disease.					changes needed at this time
	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: No clinical changes needed at this time
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: Student participation in customer service and emotional intelligence project	Measure 1: All students will participate and develop written responses to customer service case studies	Measure 1: 100% of students participated in customer service and emotional intelligence case studies	Measure 1: All students participated and developed written responses to customer service case studies	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: No clinical changes needed at this time
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the program and in the laboratory	Measure 1: Student functioning as a member of a team	Measure 1: All students will participate in team projects, each taking turns being the project manager	Measure 1: 100% of students participated in team projects, with each taking a turn as project manager	Measure 1: All students participated in and managed the team for all projects	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Evaluation of each team member for	Measure 2: All students will complete	Measure 2: 100% of students completed	Measure 2: All students completed evaluations on	Measure 2: No curricular or pedagogical

Evidence of Learning: MLS 4412 Simulated Laboratory II					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
	effective communication skills and participation in projects	evaluations on team members for effective communication skills and participation in group projects	evaluations on team members for effective communication skills and participation in group projects	team members for effective communication skills and participation in group projects	changes needed at this time

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.
** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.

Summary: MLS 4412 – MLS Simulated Laboratory II. This course teaches fundamental principles for establishing a simulated working laboratory in which students refine technical skills, problem identification and solving, work-load management, and decision-making skills, development of strategies for managing and implementing the rules and regulations that govern medical laboratory testing. MLS 4411 contains 3 of the program's identified learning goals. Data in this table are derived from 2014-2018 taught by Janet Oja and Janice Thomas.

Evidence of Learning: Courses within the Major: MLS 4412 Simulated Laboratory II

Evidence of Learning: MLS 4412					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: No clinical changes needed at this time
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2N/A	Measure 2: No clinical changes needed at this time
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1N/A	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: MLS 4412					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
and processing, analysis, interpretation, and use of quality assurance procedures.	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: No clinical changes needed at this time
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: Students participate in mock CAP inspection	Measure 1: All students will review current CAP standards and prepare a laboratory for inspection	Measure 1: 100% of students participated in mock CAP inspection and submitted a deficiency report to lab manager	Measure 1: All students successfully participated in mock CAP inspection	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Students will calibrate laboratory equipment	Measure 2: All students will calibrate laboratory equipment currently in use	Measure 2: 100% of students calibrated laboratory equipment to lab manager standards	Measure 2: All students successfully participated in calibration studies	Measure 2: No clinical changes needed at this time
Learning Outcome 5: Gather additional laboratory data and apply problem solving	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: No curricular or pedagogical changes needed at this time

Evidence of Learning: MLS 4412					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
skills to solve problems/discrepancies.	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: No clinical changes needed at this time
Learning Outcome 6: Relate laboratory findings to common disease.	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: N/A	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: No clinical changes needed at this time
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: Student participation in customer service and emotional intelligence project	Measure 1: All students will participate and develop written responses to customer service case studies	Measure 1: 100% of students participated in customer service and emotional intelligence case studies	Measure 1: All students participated and developed written responses to customer service case studies	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: N/A	Measure 2: No clinical changes needed at this time
Learning Outcome 8: Demonstrate effective communication skills and behaviors with	Measure 1: Student functioning as a member of a team	Measure 1: All students will participate in team projects, each	Measure 1: 100% of students participated in team projects, with	Measure 1: All students participated in and	Measure 1: No curricular or pedagogical

Evidence of Learning: MLS 4412					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
colleagues in the program and in the laboratory		taking turns being the project manager	each taking a turn as project manager	managed the team for all projects	changes needed at this time
	Measure 2: Evaluation of each team member for effective communication skills and participation in projects	Measure 2: All students will complete evaluations on team members for effective communication skills and participation in group projects	Measure 2: 100% of students completed evaluations on team members for effective communication skills and participation in group projects	Measure 2: All students completed evaluations on team members for effective communication skills and participation in group projects	Measure 2: No curricular or pedagogical changes needed at this time

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.
** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.

Summary: MLS 4412 – MLS Simulated Laboratory II. This course is a continuation of MLS 4411. Students staff a simulated medical laboratory and assume responsibilities associated with all facets of laboratory operations. Clinical and academic faculty serves as advisors/managers to each team of students. The process develops team building skills critical to the modern health care setting. MLS 4412 expands to examine issues that cross all health care disciplines. MLS 4412 contains 3 of the program's identified learning goals. As noted in the curriculum map, learning goals 4, 7, and 8 are utilized in this course. Data in this table are derived from five semesters taught fall 2014-2018 by Janet Oja and Janice Thomas.

Evidence of Learning: Courses within the Major: MLS 4415 Laboratory Teaching and Supervision

Evidence of Learning: Courses within the Major: MLS 4415					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 1: Demonstrate knowledge of theory underlying laboratory testing using analytical, interpretive, and problem solving skills.	Measure 1: Multiple choice questions in Management theory Quiz	Measure 1: Students are expected to score 80% or better to prove knowledge and competency	Measure 1: The majority of students were able to achieve 80% or higher competency	Measure 1: Students have proved to have knowledge of management theories	Measure 1: No changes needed at this time
Learning Outcome 2: Apply mathematical calculations to laboratory situations.	N/A	N/A	N/A	N/A	N/A
Learning Outcome 3: Perform laboratory procedures from simple to complex, including specimen collection and processing, analysis, interpretation, and use of quality assurance procedures.	Measure 1: Students are assigned to TA a laboratory where they can apply previously learned procedures in education and training and quality assurance.	Measure 1: All students will achieve 90% or better attendance to their assigned labs. Lab instructors evaluate their performance using a rubric.	Measure 1: All students participated as TAs and achieved 90% or better attendance.	Measure 1: All students successfully demonstrated their proficiency in education and training by assisting in laboratory teaching.	Measure 1: No changes needed at this time

Evidence of Learning: Courses within the Major: MLS 4415					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 4: Correlate laboratory theory and terminology to practical laboratory work	Measure 1: Students participate in online discussions analyzing management case studies scenarios and applying the management concepts previously learned.	Measure 1: The majority of students will participate and score 80% or better on all discussions.	Measure 1: The majority of students participated and scored 80% or better on all online discussions.	Measure 1: Students were able to correlate management theory to real life case study situations and management scenarios.	Measure 1: No changes needed at this time
Learning Outcome 5: Gather additional laboratory data and apply problem solving skills to solve problems/discrepancies.	N/A	N/A	N/A	N/A	N/A
Learning Outcome 6: Relate laboratory findings to common disease.	N/A	N/A	N/A	N/A	N/A

Evidence of Learning: Courses within the Major: MLS 4415					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 7: Demonstrate professional conduct and ethical behavior	Measure 1: Attendance and punctuality expectations defined in course syllabus.	Measure 1: Students will attend class section and be punctual.	Measure 1: The majority of students attended class sessions unless previously excused	Measure 1: Students attended class sessions and most were punctual. They demonstrated professional conduct and ethical behavior.	Measure 1: No changes needed at this time
	Measure 2: Students will listen to a guest speaker on resume writing and critique each other's resumes.	Measure 2: Students will attend and participate in a resume critique exercise where they will review 3 of their classmates' resumes.	Measure 2: The majority of students attended and participated in a resume critique exercise where they reviewed 3 of their classmates' resumes.	Measure 2: Students attended and participated in a resume critique exercise. They demonstrated professional conduct and ethical behavior.	Measure 2: No changes needed at this time

Evidence of Learning: Courses within the Major: MLS 4415					
Measurable Learning Goal Students will…	Method of Measurement Direct and Indirect Measures*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results**
Learning Outcome 8: Demonstrate effective communication skills and behaviors with colleagues in the program and in the laboratory	Measure 1: Students will listen to a guest speaker on interviewing skills and participate in mock interviews.	Measure 1: Students will participate as interviewer and interviewee in mock interview exercise and score 80% or higher in peer evaluations.	Measure 1: The majority of participated in the mock interviews and scored 80% or higher in their peer evaluations	Measure 1: Students were able to apply interviewing skills previously learned in class through class lectures and guest speakers	Measure 1: No changes needed at this time
	Measure 2: Students participate in online discussions analyzing management case studies scenarios and applying the management concepts previously learned.	Measure 2: The majority of students will participate and score 80% or better on all discussions.	Measure 2: The majority of students participated and scored 80% or better on all online discussions.	Measure 2: Students were able to correlate management theory to real life case study situations and management scenarios.	Measure 2: No changes needed at this time

*At least one measure per objective must be a direct measure. Indirect measures may be used to supplement evidence provided via the direct measures.

** MLS department policy states that not achieving a minimum competency of 80% overall will result in a letter grade of C. A grade below B- is not considered passing for students wishing to complete the MLS (MT) program.

MLS 4415: Students will apply sound instructional and pedagogical theory. Approaches to management, leadership of groups, human resource management, and technical supervision will also be covered and reinforced through online discussions and case study analysis. Each student will also participate as a laboratory teaching assistant (TA) in a MLS laboratory section assisting the faculty in the administration of the laboratory instruction. Each student will be assigned to a MLS course laboratory section in which expected behavior includes: active participation in laboratory teaching, demonstration of procedures, preparation of laboratory teaching materials and assisting laboratory faculty and students where ever needed. Data based on 5 semesters taught by Janice Thomas 2014-18.