



# **Annual Assessment Report**

## **2021 – 2022**

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ABSTRACT: An illustrated report of the assessment activities carried out by the Department of Medical Laboratory Sciences faculty for the 2021-2022 academic year. Every attempt has been made to report objective, accurate information. Any errors in reporting are not intentional, and the author welcomes correction when merited.

# Medical Laboratory Science (MLS) Program 2021-2022 Assessment Report

## I. INTRODUCTION

### A. History and Location

Founded in 1874, Andrews University is currently located in Berrien Springs, Michigan, and it is the sponsoring institution of the Program for Medical Laboratory Science (MLS). The first MLS Program cohort began in the fall of 1988. The program was first accredited by the National Accrediting Agency for Clinical Laboratory Science (NAACLS) in the spring of 1989. The MLS Program remains accredited by NAACLS and is offered through the Department of Medical Laboratory Sciences, housed in Halenz Hall.

The MLS Program is supported by one staff member and five MLS full-time faculty members, one of whom serves as Department Chair and Program Director. There is a faculty vacancy, which we hope can be filled soon. The Program's capacity was expanded from 24 to 32 in August 2014 after the construction of two brand-new student laboratories, each with 16 student stations.

### B. MLS Program Organization

The Andrews University Program for Medical Laboratory Science is a 12-month program culminating in a 16-week clinical practicum. Students may complete the MLS Program through any one of the following tracks:

- **BSMLS + MLS Certificate**

- The 3 + 1 track comprises three years of undergraduate (pre-clinical) studies plus one clinical year (three semesters). The first three years of undergraduate study include general education courses (Andrews Core Experience or ACE), cognate sciences, and MLS fundamental courses. Students select elective courses in consultation with their faculty advisor and take into consideration the student's career goals and interests. MLS majors apply for admission into the Clinical Year Program during the fall semester of their junior year. This is the typical track for students seeking their first degree, such as students beginning their college education at Andrews University or transfer students. These students earn a Bachelor of Science in Medical Laboratory Sciences (MLS) and an MLS Certificate.
- The 14-month track is for students who have completed a first degree that includes 16 semester credits of biological sciences, 16 semester credits of chemistry--with at least one semester of organic or Biochemistry, and one college-level course in mathematics. In addition to earning an MLS Certificate, these students may elect to obtain a second degree (BSMLS) by completing a religion course.

- MLS Certificate (only)
  - This is a 14-month track for students who have completed a first degree that includes 16 semester credits of biological sciences, 16 semester credits of chemistry--with at least one semester of organic or Biochemistry, and one college-level course in mathematics. In addition to earning an MLS Certificate, these students may elect to obtain a second degree (BSMLS) by completing one religion course (refer to BSMLS + MLS Certificate above).

The deadline for submitting an MLS Program application is January 31. The admissions committee typically meets in late February or early March. Students admitted to the last year of the degree program (Clinical Year Program) take coursework that combines a rigorous competency-based science curriculum with community-sponsored clinical training. During the first two semesters of the clinical year, students complete coursework in modern spaces, which include a lecture room and two custom-built and well-equipped student laboratories.

The three semesters of the MLS Clinical Year are divided as follows: The Fall Semester and two months of the Spring Semester are composed of didactic educational experiences enhanced with hands-on student laboratories on the Berrien Springs campus. Upon completing the on-campus coursework, students are assigned to one or more program-affiliated laboratories to complete their clinical practicum. During the 16-week clinical training period, students spend 40 hours per week applying knowledge and skills to perform a wide variety of testing in an accredited medical laboratory and to develop further discipline-specific competency under the supervision of clinical instructors. Currently, the MLS Department maintains affiliations with certified laboratories in Colorado, Florida, Illinois, Indiana, Kentucky, Maryland, Michigan, Ohio, Tennessee, Texas, and Washington, DC.

Program graduates are eligible to take the *American Society for Clinical Pathology (ASCP) Medical Laboratory Scientist (MLS)* national board certification examination and the *American Medical Technologists (AMT)* certification exam. MLS graduates are eligible to pursue career opportunities in various laboratory settings, including but not limited to hospital laboratories, clinics, forensic laboratories, veterinary clinics, medical, biotechnology, industrial research, and public health laboratories; cytogenetics, cytotechnology, and histology.

The Medical Laboratory Science Program is accredited by the *National Accrediting Agency for Clinical Laboratory Science (NAACLS)*, 5600 North River Road, Suite 720, Rosemont, Illinois 60018-5119.

## II. PROGRAM OUTCOMES

**A. Enrollment Trends:** The number of clinical year applications shows a slight decline for 2022, contributing to the slight decline observed in Figure 1. A primary factor influencing enrollment trends over the years is the lack of visibility for the MLS profession. While many college science students might be good candidates for the MLS program and profession, they are unaware that MLS is an option for a vital and promising healthcare career with many opportunities. High school and middle school students are also unaware of the clinical laboratory science practice field because medical laboratory science is not currently included in STEM programs. We continue to work towards rectifying these issues by seeking opportunities to improve MLS major visibility at the university level and continue recruiting efforts targeting high school and middle school students. The number of admitted students reflects applicant qualifications and Program capacity, which will not exceed 32 (Figure 2).

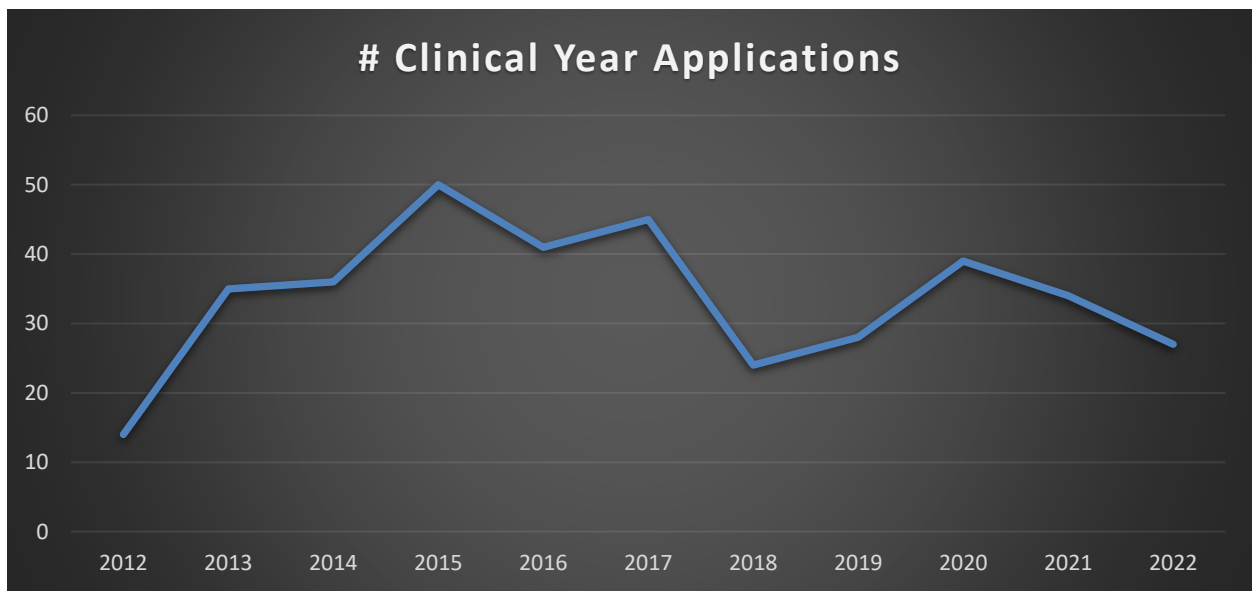


Figure 1. Clinical Year Applications (2012 – 2022)

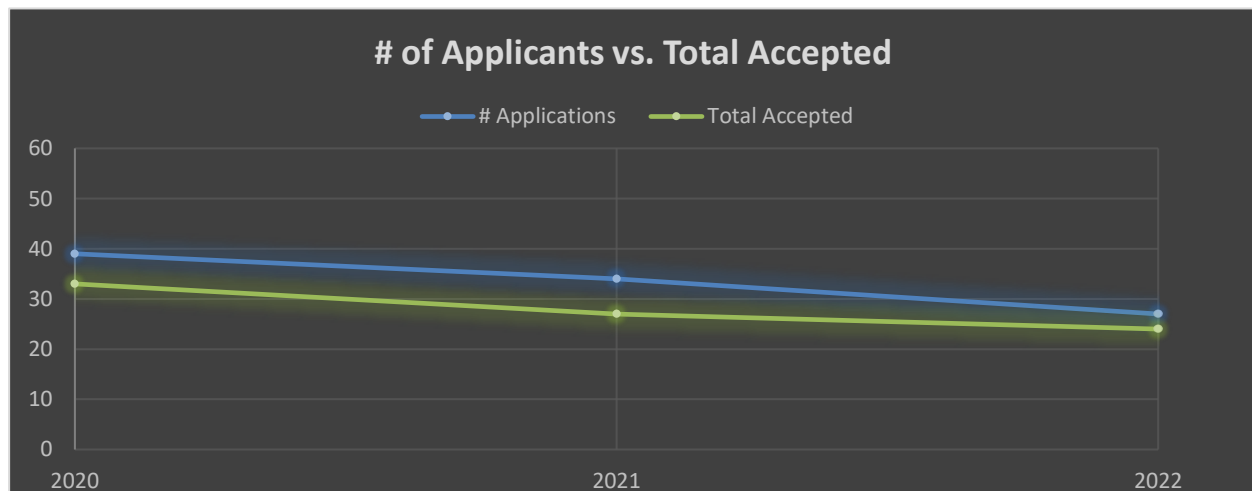


Figure 2. # of Applicants vs. Total Accepted (Class of 2020 – 2022)

**B. Program Completion Rates:** Program completion rates continue to exceed the target of at least 80% (Figure 3). Program completion rates for the last three years are as follows:

- 2020 = 100% (n=24)
- 2021 = 100% (n= 20)
- 2022 = 100% (n= 20)

*Note: Program completion rates are calculated using the NAACLS standard of comparing the number of students who began the “final half” of the program and subsequently completed the program versus those who left the program (voluntarily or involuntarily). The “final half” of the program is defined as the clinical practicum portion of the program.*

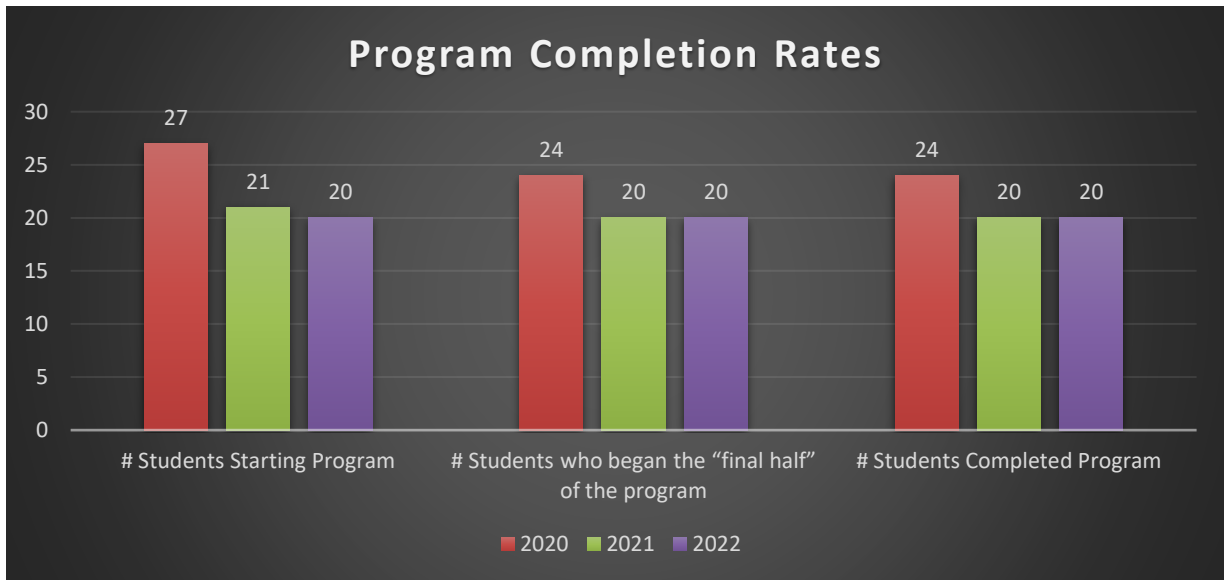


Figure 3. Program Completion Rates (2020 – 2022)

**C. Employment/Placement Rates:** Program employment/placement rates continue to exceed the program target of at least 80% (Figure 4). All 20 students who completed the clinical year program in 2022 found employment within six months of graduation or went on to continue their education. The yearly average employment/placement rate for the last three years (2020-2022) are as follows:

- 2020 = 100% (n=24)
- 2021 = 100% (n= 20)
- 2022 = 100% (n= 20)

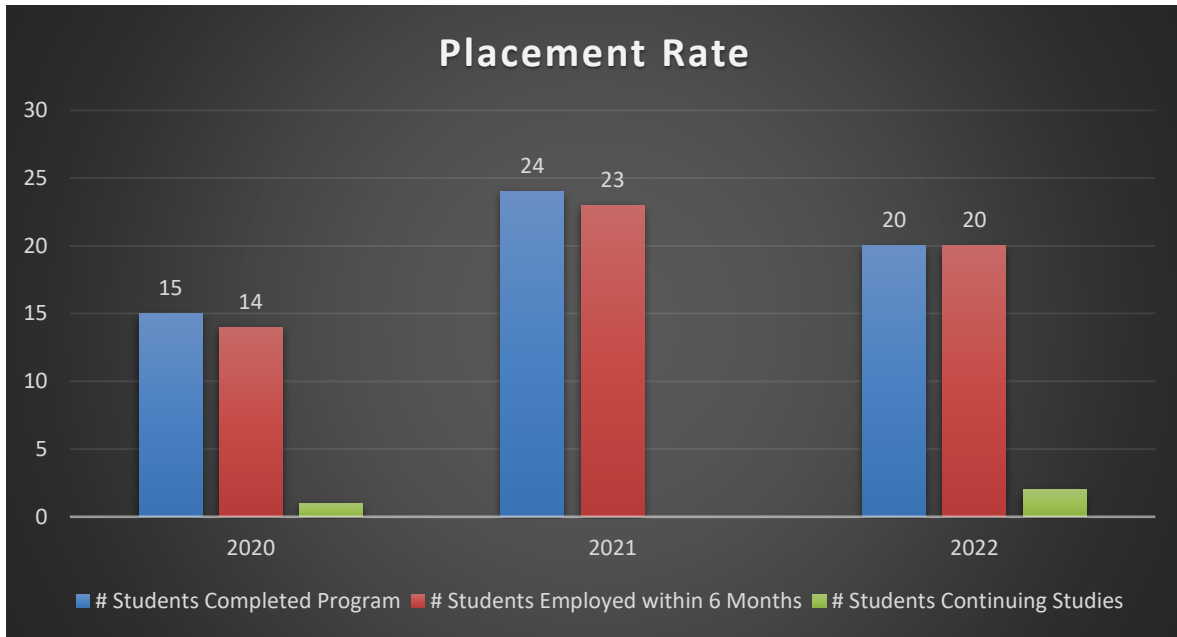


Figure 4. Placement Rate (2020 – 2022)

**D. Pass Rates on National Board Exam:** The pass rate for the class of 2022 was 100% (n=20), thus exceeding the program’s target of at least 80%. Typically, the pass rate reported reflects the number of students that take the Board of Certification (BOC) offered by the American Society of Clinical Pathologists (ASCP). However, for the class of 2021, the pass rates also reflect the number of students who choose to take the American Medical Technologists (AMT)\* exam to gain certification. The BOC pass rate for the class of 2021 was 72%, and the combined BOC and AMT pass rates were 83% (Figure 5). The drop in BOC passing rates for the class of 2021 appears to be somewhat explained by the aftermath of the COVID-19 pandemic. Students seemed to struggle to “get back to normal.” We observed mental fatigue due to a variety of issues, such as Long COVID and emotional distress due to the loss of loved ones.

Both the BOC and AMT exams include the following seven subtest areas: 1) Transfusion Medicine and Blood Banking (BBNK); 2) Chemistry (CHEM); 3) Hematology and Hemostasis (HEMA); 4) Immunology (IMMU); 5) Laboratory Operations (LO); 6) Microbiology (MICR); and 7) Urinalysis (UA).

*Two (2) of the students from the class of 2021 who did not pass the BOC on their first attempt did not retake the BOC. Instead, they took the AMT within one year of graduation and passed. This contributed to the lower final passing rate for the BOC.*

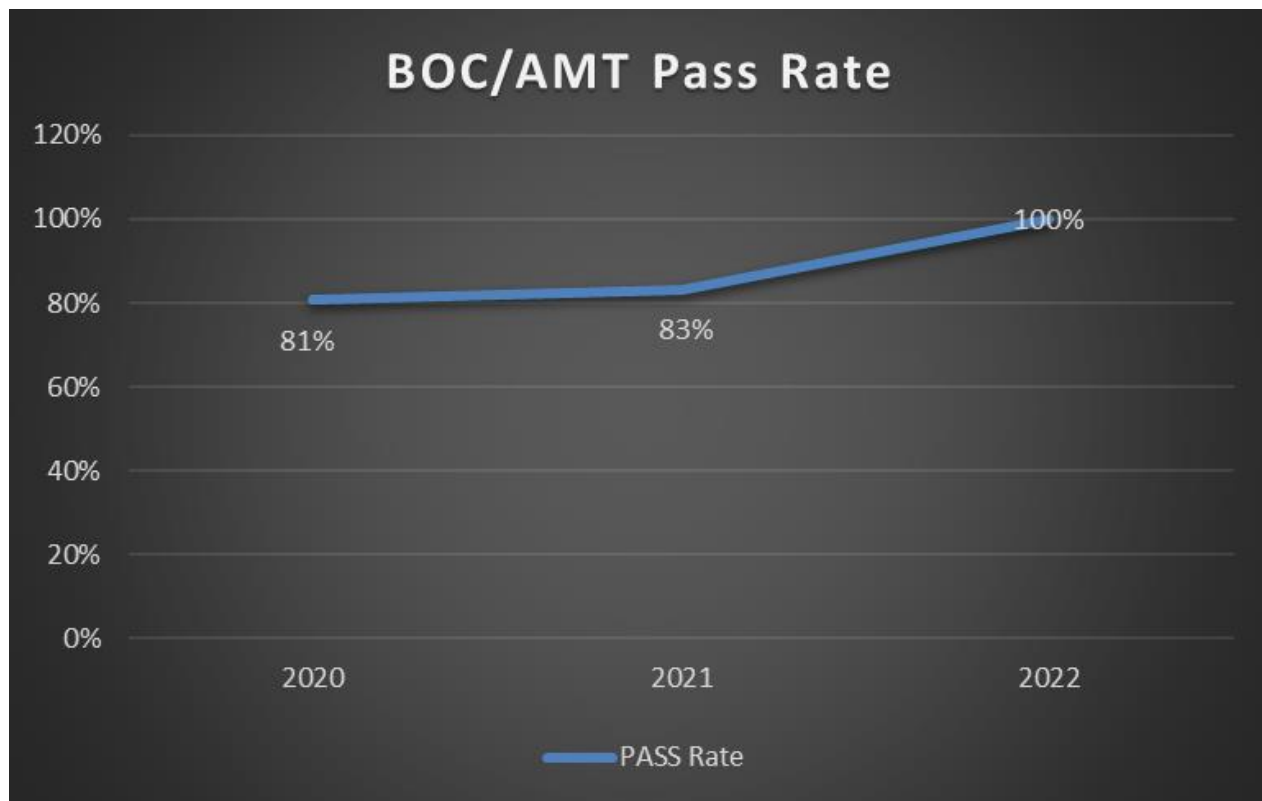


Figure 5. BOC Pass Rate (2020 – 2022)

### III. PROGRAM MISSION/PURPOSE, GOALS, AND STUDENT LEARNING OUTCOMES

- A. *The MLS program faculty reviewed assessment activities for the 2021-2022 year. The program’s purpose, objectives, and student learning outcomes were reviewed and affirmed as the following:*

#### Faculty & Staff Commitment

As professionals and educators, we, the faculty and staff of the Andrews University Program for Medical Laboratory Sciences, are committed to providing our students with experiences that prepare them to practice as scholastically accomplished and competent Medical Laboratory Scientists. To that end, we acknowledge our responsibility and pledge our commitment to:

- Demonstrate professionalism through our words and actions
- Provide knowledge-building, skill-developing experiences for all our students
- Create equal-opportunity learning environments within which all our students are educated in an atmosphere of fairness and impartiality
- Foster students’ commitment to lifelong learning
- Endorse student participation in professional organizations
- Promote student scholarship and professional achievement
- Contribute to the ongoing development and growth of medical laboratory science pedagogy through faculty participation in scholarship, service, and outreach

### Program Mission/Purpose

The mission of the Department of Medical Laboratory Sciences (MLS), in harmony with Andrews University and the Seventh-day Adventist Church, is to prepare students for Christian service as Medical Laboratory Scientists. The MLS department encourages faculty in professional, educational, and spiritual growth. The MLS faculty educates students to develop excellence in the professional skills necessary for a life work of service in quality health care and dedication to improving the human condition. MLS graduates will minister to the needs of others by practicing and promoting standards of excellence as medical laboratory science professionals.

### Program Goals and General Student Learning Objectives (SLO):

**Goal 1:** Christian service as MLS professionals.

To prepare students for Christian service as medical laboratory science professionals

**Goal 2:** MLS Entry-Level Professional Competence

Provide MLS profession-related comprehensive instruction sufficient to meet entry-level MLS employment competencies—including attention to professional growth, personal student-professor interactions, excellent advising, and an emphasis on the spiritual dimensions of the health care field.

#### **SLO 1:** MLS Comprehensive Didactic Competency

- Achieve Medical Laboratory Scientist entry-level didactic competency in the following scientific content and as defined by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS):
  - Clinical Chemistry
  - Hematology & Hemostasis
  - Immunology
  - Immunohematology & Transfusion Medicine
  - Microbiology
  - Molecular Diagnostics
  - Renal, Urinalysis & Body Fluids
  - Laboratory Operations
  
- Achieve a passing score in the Board of Certification by the ASCP or the American Medical Technologists (AMT) exam within the first year after graduation.

#### **SLO 2:** Application of MLS Professional Skills

- Achieve Medical Laboratory Scientist entry-level psychomotor, clinical, and professional skills for service to humanity.
- Demonstrate competency to perform a full range of test protocols in the contemporary medical laboratory setting encompassing pre-analytical, analytical, and post-analytical components of laboratory services, including body fluids, chemistry, hematology, immunohematology, immunology, microbiology, molecular diagnostics, urinalysis, and phlebotomy.
- Exhibit proficiency in evaluating clinical data and interpreting results, problem-solving, troubleshooting, and using statistical approaches when evaluating data.
- Exhibit administrative skills consistent with philosophies of quality assurance, continuous quality improvement, laboratory education, financial resource management, and appropriate composure under stressful conditions.



- Apply safety and governmental regulations and standards to medical laboratory practice.

**SLO 3:** Practice Ethics and Professionalism

- Demonstrate ethical and professional behaviors in the program's didactic and practicum portions.
- Model the professional traits of an entry-level healthcare practitioner.
- Display professional conduct, respecting the feelings and needs of others, protecting the confidentiality of patient information, and avoiding personal concerns and biases to interfere with the welfare of patients.
- Demonstrate effective communication skills, including competent written, oral, and visual communication, to ensure accurate and appropriate transfer of information.
- Embrace interprofessional collaborative practice that strengthens the healthcare team and enhances patient outcomes.

**Goal 3:** Program Accreditation  
Maintain Program accreditation.

Program Learning Outcomes

Upon graduation from the Program for Medical Laboratory Science and initial employment, the Medical Laboratory Science Andrews University graduate should be inclined to engage in Christian service as an MLS Professional and be able to demonstrate entry-level competencies in the following areas of professional practice:

1. Reflect ethical and moral attitudes and principles essential for gaining and maintaining the trust of professional associates, the support of the community, and the confidence of the patient and family;
2. Maintain an attitude of respect for the patient and confidentiality of patients' records and/or diagnoses;
3. Develop and establish procedures for collecting, processing, and analyzing biological specimens and other substances;
4. Perform analytical tests on body fluids, cells, and other clinical substances;
5. Integrate and relate data generated by the various clinical laboratory departments while making decisions regarding possible discrepancies;
6. Confirm abnormal results, verify quality control procedures, and develop solutions to problems concerning the generation of laboratory data;
7. Make decisions concerning the results of quality control and quality assurance measures and institute proper procedures to maintain accuracy and precision;
8. Establish and perform preventive and corrective maintenance of equipment and instruments, as well as identify appropriate sources for repairs;
9. Develop, evaluate, and select new techniques, instruments, and methods in terms of their usefulness and practicality within the context of a given laboratory's personnel, equipment, space, and budgetary resources;
10. Demonstrate professional conduct and interpersonal skills with patients, laboratory personnel, other health care professionals, and the public;
11. Establish and maintain continuing education as a function of growth and maintenance of professional competence;
12. Provide leadership in educating other health personnel and the community;
13. Exercise principles of management, safety, and supervision;

14. Apply principles of educational methodology, and
15. Apply principles of current information systems.

#### **IV. PROGRAM ASSESSMENT**

- A. The MLS faculty have agreed on the following assessment plan, as shown in Table 1 (p. 11).

Table 1. Assessment Plan



**Assessment Plan of Medical Laboratory Science Program by Year**

NAACLS Benchmarks	Program Student Learning Outcomes (SLO)	Measure	Target	Assessment of SLO by Year		
				2021-2022	2020-2021	2019-2020
<b>Graduation Rates (70%)</b>	<b>SLO 1:</b> MLS Comprehensive Didactic Competency	<b>Direct</b> <i>-Clinical Year Didactic Competencies</i>	1. Clinical-year students will achieve a grade no lower than "C-" in all (clinical year) MLSC-400 level courses. AND 2. Clinical-year students will maintain a minimum GPA of 2.50 during the clinical year.	<b>Target Met</b>	<b>Target Met</b>	<b>Target Met</b>
<b>Certification Rates (75%)</b>	<b>SLO 2:</b> Application of MLS Professional Skills	<b>Direct</b> <i>-BOC Scores -Clinical Evaluation of Student Performance</i>	The percentage of graduates that pass the Medical Laboratory Sciences Board of Certification (BOC) by the American Society for Clinical Pathology (ASCP) within one year of graduation will be 80% or greater.	<b>Target Met</b>  The BOC pass rate:  100% (n=20)	<b>Target Met</b>  The BOC & AMT pass rates:  83% (n=18)	<b>Target Met</b>  The BOC pass rate:  81% (n=21)
<b>Placement Rates (70%)</b>	<b>SLO 3:</b> Practice Ethics and Professionalism	<b>Indirect</b> <i>-Student feedback on the placement -Employment feedback</i>	The percentage of graduates who obtained employment or continued their education within the first six months after graduation will be 80% or greater.	<b>Target Met</b> 100% of those seeking employment in the Medical Laboratory Sciences field were employed within six months after graduation.	<b>Target Met</b> 100% of those seeking employment in the Medical Laboratory Sciences field were employed within six months after graduation.	<b>Target Met</b> 100% of those seeking employment in the Medical Laboratory Sciences field were employed within six months after graduation.

## V. SUMMARY OF ASSESSMENT ACTIVITIES

A. DIRECT MEASURE: NAACLS Benchmark for accredited programs – Three-year consecutive results of graduate certification rates demonstrate an average of at least 75% pass rate on the ASCP-BOC examinations for those who take the exam within the first year of graduation as calculated by the most recent three-year period. Three-year averages should be and are calculated using raw student numbers. Records for assessment activities are kept in the Office of the MLS Department Chair and may be found in individual student records maintained in the MLS program office.

- Program action: Program faculty assessed professional program graduates using results from the American Society for Clinical Pathology (ASCP) Board of Certification (BOC) Medical Laboratory Scientist (MLS) exam.
- Strengths and Weaknesses in Student Learning Outcomes: The most recent three-year average pass rate on the ASCP BOC MLS exam (Table 2) is above the NAACLS benchmark of at least 75%. The program’s average pass rate for the last three years is 84.75% for those who take the exam within the first year of graduation. The student’s first-time pass rate for this cycle was 85% (n=20), which is higher than the first-time pass rate of University programs (77%) and National (76%). The average mean scaled score for the 2022 examination cycle was 471, slightly lower than other University programs (476) and National (474).
- Recommendations for Improvements: The faculty is completing another comprehensive review of the didactic material in consultation with the ASCLS Body of Knowledge (BOK) and updated BOC exam outline. Additional assessment resources will include a BOC review textbook, five discipline-specific review exams, and a mock BOC exam in which students must achieve a minimum of 80%. The faculty will continue to monitor program outcomes and will make curriculum adjustments as needed.

Table 2. Three-year BOC Pass Rates

	Class of 2020	Class of 2021	Class of 2022
Total number of graduates	24	20	20
Number of graduates that sat for the exam within one year of graduation	21	18	20
Number of examinees that passed the exam within the first year of graduation	17	13	20
Yearly BOC Pass Rate (%)	81%	72%*	100%
<b>3-year average: 84.75%</b>			

\*Does not include the AMT exam pass rates. The combined BOC & AMT pass rate is 83% (n=18).

Table 3. Three-year ASCP-BOC Certification Rates

Andrews University Program for Medical Laboratory Science			
CYCLE: 2020*	Program	Universities	National
Number of Examinees	21	3263	4489
Mean Scale Score	462	483	486
Number Passing (%)	16 (76.19%)	2533 (78%)	3477 (77.46%)
Number Failing (%)	5 (23.81%)	730 (22%)	1012 (22.54%)
CYCLE: 2021*	Program	Universities	National
Number of Examinees**	19	2371	3273
Mean Scale Score	443	471	476
Number Passing (%)	13 (68.42%)	2371 (75%)	3273 (76.06%)
Number Failing (%)	6 (31.58%)	773 (25%)	1030 (23.94%)
CYCLE: 2022	Program	Universities	National
Number of Examinees**	20	3335	4575
Mean Scale Score	471	476	474
Number Passing (%)	17 (85.00%)	2555 (77%)	3466 (75.76%)
Number Failing (%)	3 (15.00%)	780 (23%)	1109 (24.24%)

NOTE: \*ASCP calculates and reports data for first-time examinees, while NAACLS's benchmark report includes all examinee attempts within the first year after graduation. Data in this table is for first-time examinees. \*\*Includes one first-time examinee from the class of 2020.

B. INDIRECT MEASURES:

1. Graduation rates - NAACLS benchmark for graduation rates - Three years of consecutive results of graduation rates demonstrating an average of at least 70% of students who have begun the final half of the program go on to successfully graduate from the program as calculated by the most recent three-year period. Records for assessment activities are kept in the Office of the MLS Department Chair and may be found in individual student records maintained in the MLS program office.

*NOTE: Our program consists of three (3) consecutive semester terms, divided into two parts: the didactic portion and the clinical practicum portion. Students begin the program in the fall and complete the program at the end of the following summer term. Accordingly, the program determines the final half of the program to be when students have completed the didactic portion and begin the second and last portion of the program, the third semester or summer semester term, which consists of the clinical practicum.*

- Program action: Program faculty reviewed program graduation rates.
- Strengths and Weakness in Program Outcomes: The most recent three-year average for graduation rates (Table 4) is well above the NAACLS benchmark of at least 70% of students who have begun the final half of the program and go on to graduate from the program successfully.
- Recommendations for Improvements: The faculty recommends continuing the current practices that contribute to the program graduation rates.

Table 4. Three-year Graduation Rates

	Class of 2019	Class of 2020	Class of 2021
Number of students beginning the final half of the program	15	24	20
Number of graduates	15	24	20
Graduation Rate (%)	100%	100%	100%
<b>Graduation 3-year average: 100%</b>			

2. Placement rates (NAACLS benchmark for graduate placement rates) - Graduate placement rates demonstrate that an average of at least 70% of respondent graduates either find employment in the field or a closely related field (for those who seek employment) or continue their education within one year of graduation as calculated by the most recent three-year period. Records for assessment activities are kept in the Office of the MLS Department Chair and may be found in individual student records maintained in the MLS program office.
- Program action: Program faculty reviewed graduates' placement rates.
  - Strengths and Weakness in Program Outcomes: The most recent three-year average for placement rates (Table 8) are well above the NAACLS benchmark of at least 70% of respondent graduates either find employment in the field or a closely related field (for those who seek employment) or continue their education within one year of graduation.
  - Recommendations for Improvements: The faculty made no recommendations for improvements.

Table 5. Three-year Placement Rates

	Class of 2020	Class of 2021	Class of 2022
Number of graduates	24	20	20
Number of graduates that gain employment in the field or continued their education within one year of graduation	24	20	20
Graduation Rate (%)	100%	100%	100%
<b>Graduation 3-year average: 100%</b>			

\*Lost to follow-up are counted as placed.

3. Table 6 shows the attrition rates for the last three consecutive years. These are all the students who began the "final half" of the program and subsequently completed the program versus those who *left the program (voluntarily or involuntarily)*. The "final half" of the program has been defined as the *clinical practicum portion of the program*. Program attrition is typically due to academic dishonesty and/or inability to meet the progression criteria, including maintaining a minimum 2.5 GPA in all portions of the program.

Table 6. Three-year Attrition Rates

	Class of 2020	Class of 2021	Class of 2022
Number of students that began the "final half" of the program	24	20	20
Number of students that did not complete the program	0	0	0
Attrition Rate (%)	0%	0%	0%
<b>Attrition 3-year average: 0%</b>			

## VI. MEDICAL LABORATORY SCIENCE CLINICAL YEAR CURRICULUM SEQUENCE

FALL SEMESTER		
Course Number	Course Title	Credits
MLSC401	Clinical Year Seminar & Research Methodology	1
MLSC411	Hematology & Lab	3
MLSC421	Clinical Immunology, Virology & Molecular Diagnostics & Lab	2
MLSC431	Clinical Bacteriology & Lab	4
MLSC441	Immunohematology & Lab	3
MLSC451	Clinical Chemistry I & Lab	3
<b>Total Credits</b>		<b>16</b>
SPRING SEMESTER		
MLSC405	Clinical Year Seminar & Research Project	1
MLSC414	Body Fluids & Hemostasis	3
MLSC432	Clinical Mycology & Parasitology & Lab	2
MLSC442	Transfusion Medicine & Lab	3
MLSC452	Clinical Chemistry II & Lab	3
MLSC470	Laboratory Operations & Best Practices	3
MLSC483	Comprehensive Review & Written Examination	1
<b>Total Credits</b>		<b>16</b>
SUMMER SEMESTER		
MLSC415	Clinical Hematology, Hemostasis & Body Fluids Practicum	3
MLSC423	Clinical Immunology, Virology & Molecular Diagnostics Practicum	1
MLSC433	Clinical Microbiology Practicum	4
MLSC443	Clinical Immunohematology Practicum	4
MLSC453	Clinical Chemistry Practicum	3
<b>Total Credits</b>		<b>15</b>