Andrews University
Department of Medical Laboratory Sciences

Annual Assessment Report

2023 – 2024

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ABSTRACT: An illustrated report of the assessment activities carried out by the Department of Medical Laboratory Sciences faculty for the 2023-2024 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 2023-2024 Assessment Report

I. INTRODUCTION

A. History and Location

Founded in 1874, Andrews University is 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 National Accrediting Agency first accredited the program for Clinical Laboratory Science (NAACLS) in the spring of 1989. The MLS Program maintains NAACLS accreditation and is offered through the Department of Medical Laboratory Sciences, housed in Halenz Hall.

The MLS Program is supported by one staff member and four MLS full-time faculty, one of whom serves as Department Chair and Program Director. There is one faculty vacancy, which we anticipate will 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 transferring students who wish to earn their first degree at Andrews University. These students earn a Bachelor of Science in Medical Laboratory Sciences (BSMLS) and a Medical Laboratory Science (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.

The professional phase of the Medical Laboratory Science Program at Andrews University is defined as the final year of the degree program, referred to as the *Clinical Year Program*. During this phase, students engage in a rigorous, competency-based curriculum integrating advanced MLS-specific coursework with structured clinical practice education.

The professional phase begins in August every year and consists of three consecutive semesters. The Fall Semester and the initial two months of the Spring Semester are dedicated to didactic instruction and hands-on laboratory practice at the Berrien Springs campus in modern, custom-built facilities. Following successful completion of the on-campus component, students enter the last half of the program, a 16-week clinical practicum, at one or more affiliated medical laboratories.

During the practicum, students engage in 40 hours per week of supervised clinical training, applying their knowledge and skills in real-world settings under the supervision of qualified clinical instructors. This experience allows students to perform a comprehensive range of laboratory procedures and demonstrate discipline-specific competencies required for National Certification eligibility and entry into professional practice.

The MLS Department maintains affiliations with certified laboratories in Colorado, Florida, 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 of Certification 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 at Andrews University 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: There was a moderate increase in the number of clinical year applications for 2024, as seen 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.

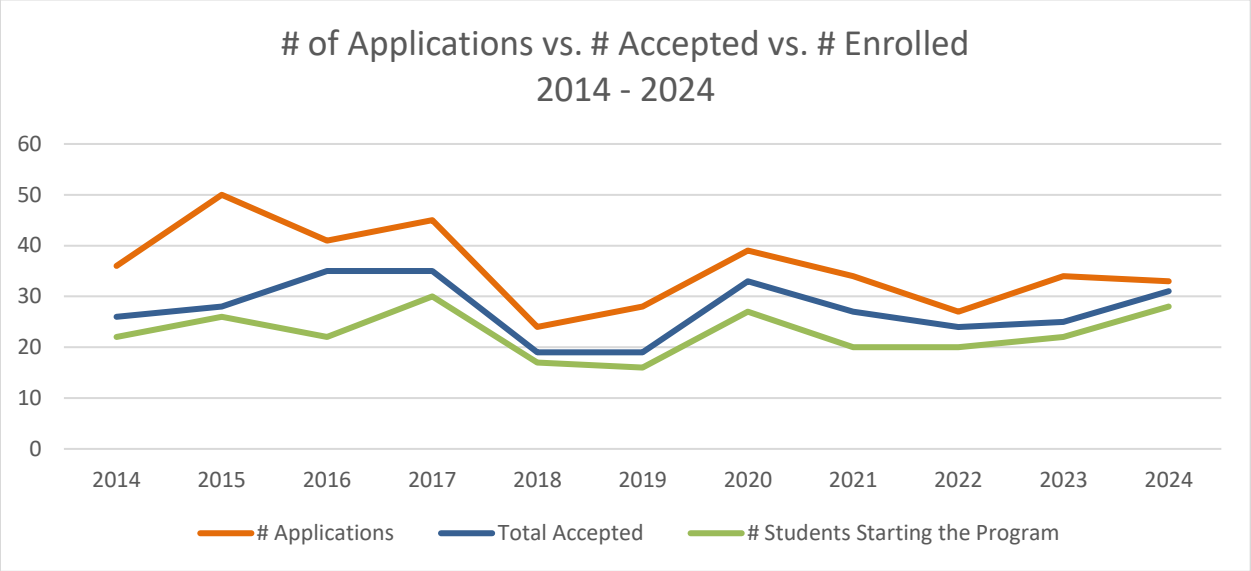

Figure 1. # of Applicants vs. # Accepted vs. #Enrolled (2014 – 2024)

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

- 2022 = 100% (n=20)
- 2023 = 100% (n=21)
- 2024 = 96% (n=26)

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.

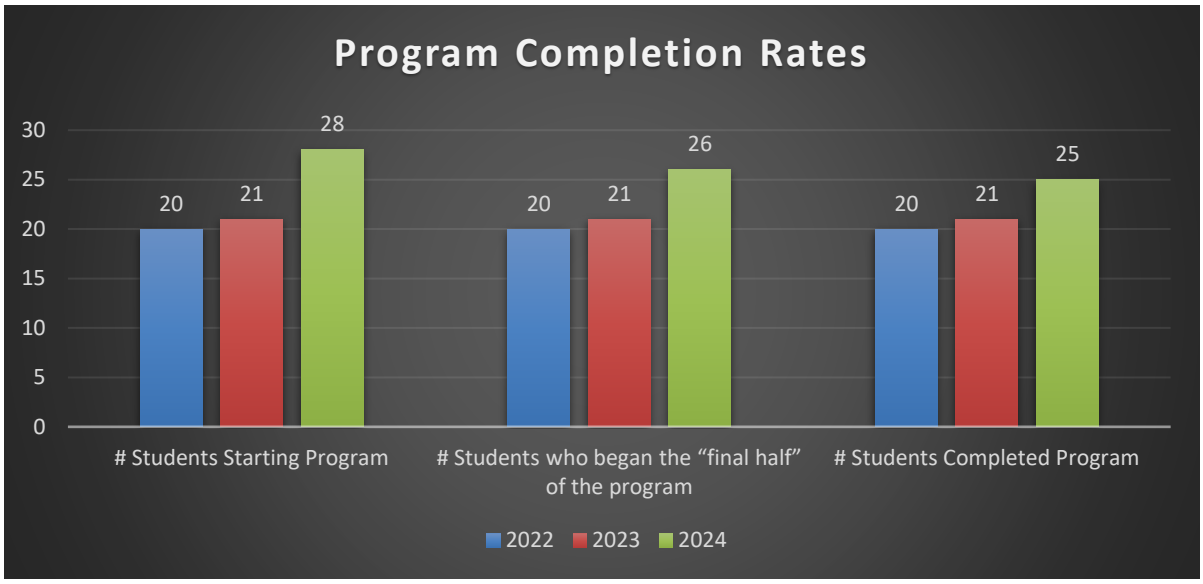

Figure 2. Program Completion Rates (2022 – 2024)

C. Employment/Placement Rates: Program employment/placement rates continue to exceed the program target of at least 80% (Figure 3). All 25 students who completed the clinical year program in 2025 found employment within six months of graduation or went on to continue their education. The yearly average employment/placement rates for the last three years (2022-2024) are as follows:

- 2022 = 100% (n=20)
- 2023 = 100% (n=21)
- 2024 = 100% (n=25)

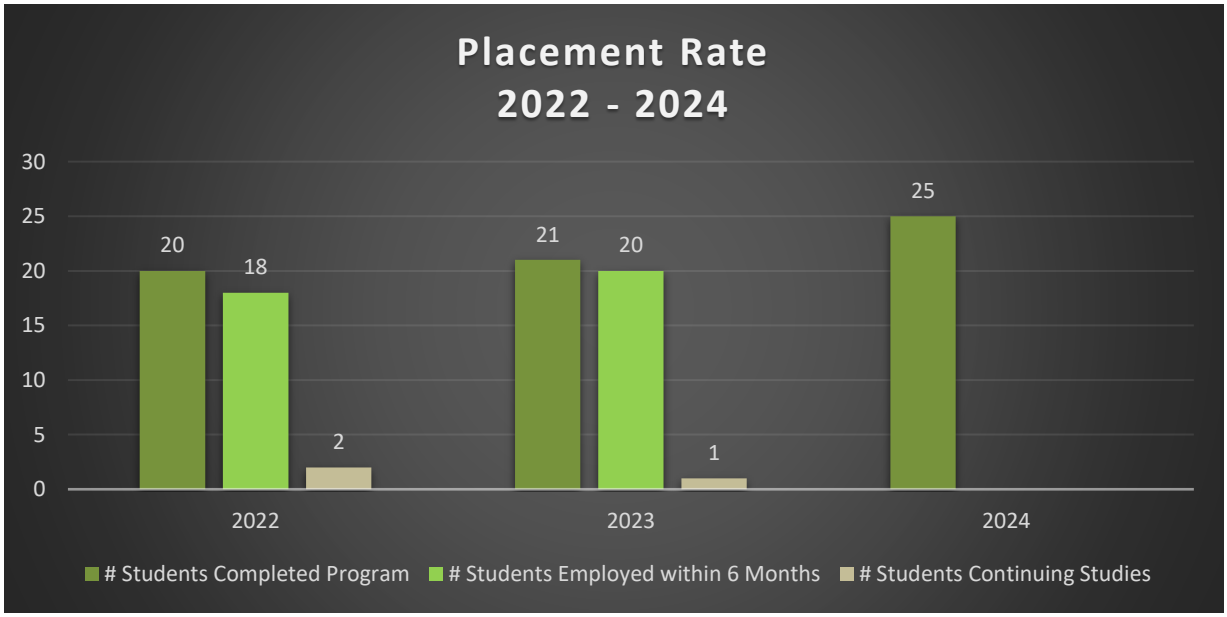

Figure 3. Placement Rate (2022 – 2024)

D. Pass Rates on National Board Exam: The pass rate for the class of 2024 was **73.91%** (n=23), which falls below the program's target of 80% and the NAACLS benchmark of 75%. Because this outcome is atypical of the program's historical performance on the BOC, the faculty conducted a detailed review to identify contributing factors. An analysis of student performance data revealed that the six students who did not pass the BOC within the first-year examination shared one or more characteristics:

- Two-thirds of the students were guest students from affiliated institutions.
- English as a Second Language (ESL) learners, which may have contributed to challenges in comprehension and interpretation of exam content.
- Lower level of student motivation and engagement. Some of these students had high science /math GPAs, yet they failed the BOC.

These findings suggest that academic performance and language proficiency are key factors influencing board examination outcomes and highlight potential areas for targeted academic and language support. The faculty will continue to monitor admissions requirements, student performance indicators in MLS pre-clinical courses, as well as student motivation and engagement factors.

Both the BOC 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).

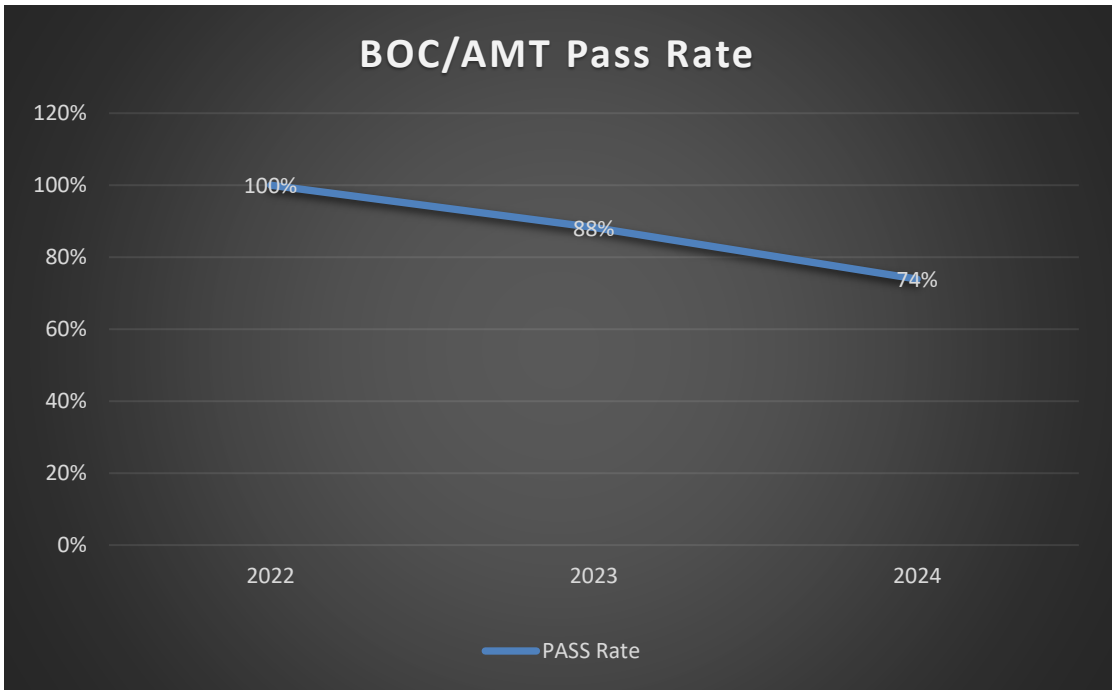

Figure 4. BOC Pass Rate (2022 – 2024)

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

A. *The MLS program faculty* reviewed assessment activities for the year 2023-2024. The program's purpose, objectives, and student learning outcomes were reviewed and affirmed as follows:

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 lifelong 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 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 on 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.

<u>Program Learning Outcomes</u>

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. 10).

Table 1. Assessment Plan

Department of Medical Laboratory Sciences
Andrews University

Assessment Plan of Medical Laboratory Science Program by Year

NAACLS Benchmarks	Program Student Learning Outcomes (SLO)	Measure	Program Target	Assessment of SLO by Year		
				2023-2024	2022-2023	2021-2022
Graduation Rates (70%)	**SLO 1:** MLS Comprehensive Didactic Competency	**Direct** *-Clinical Year Didactic Competencies*	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.	**Target Met**	**Target Met**	**Target Met**
Certification Rates (75%)	**SLO 2:** Application of MLS Professional Skills	**Direct** *-BOC Scores* *-Clinical Evaluation of Student Performance*	The percentage of graduates who 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.	**Target Not Met** The BOC pass rate: 73.91% (n=23)	**Target Met** The BOC pass rate: 88% (n=17)	**Target Met** The BOC pass rate: 100% (n=20)
Placement Rates (70%)	**SLO 3:** Practice Ethics and Professionalism	**Indirect** *-Student feedback on the placement* *-Employment feedback*	The percentage of graduates who obtained employment or continued their education within the first six months after graduation will be 80% or greater.	**Target Met** 100% of those seeking employment in the Medical Laboratory Sciences field were employed within six months after graduation.	**Target Met** 100% of those seeking employment in the Medical Laboratory Sciences field were employed within six months after graduation.	**Target Met** 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 are calculated using raw student numbers. Records of assessment activities are kept in the Office of the MLS Department Chair.

- Program action: Program faculty assessed professional program graduates primarily using results from the American Society for Clinical Pathology (ASCP) Board of Certification (BOC) Medical Laboratory Scientist (MLS) exam. When disclosed, AMT passing rates are also included.

- 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 86.67% for those who take the exam within the first year of graduation. The student's first-time pass rate for this cycle is 65.21% (n=23)*, which is 13% lower than the first-time pass rate of university programs (78%) and 14% lower than the National (77.08%) passing rate. The average mean scaled score for the 2024 examination cycle was 421, noticeably lower than other University programs (482) and the National (481).
  **Note: This cycle's BOC Program Performance Report includes an examinee from the MLS Class of 2023 who is not included in this calculation.*

- Recommendations for Improvements: The faculty is conducting 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 continue to make curriculum adjustments as needed. Section II.D (p.6) of this report offers an additional narrative.

Table 2. Three-year BOC Pass Rates

	Class of 2024	Class of 2023	Class of 2022
Total number of graduates	25	21	20
Number of graduates who sat for the exam within one year of graduation	23	17	20
Number of examinees who passed the exam within the first year of graduation	17	15	20
Yearly BOC Pass Rate (%)	73.91%	82.24%	100%
3-year average: 86.67%			

Table 3. Three-year ASCP-BOC Certification Rates

Andrews University Program for Medical Laboratory Science			
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%)
CYCLE: 2023*	**Program**	**Universities**	**National**
Number of Examinees**	18	3153	4453
Mean Scale Score	455	476	477
Number Passing (%)	72.22%	76%	75.54%
Number Failing (%)	27.78%	24%	24.46%
CYCLE: 2024*	**Program**	**Universities**	**National**
Number of Examinees	24**	3308	4607
Mean Scale Score	421	482	481
Number Passing (%)	15 (62.50%)	2581 (78%)	3551 (77.08%)
Number Failing (%)	9 (37.50%)	727 (22%)	1056 (22.92%)

*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 only. **BOC Program Performance Report for this cycle includes an examinee from the MLS Class of 2023.*

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, which consists of the 16-week clinical practicum.

   - Program action: Program faculty reviewed program graduation rates.

   - Strengths and Weaknesses 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 contributing to program graduation rates.

Table 4. Three-year Graduation Rates

	Class of 2024	Class of 2023	Class of 2022
Number of students beginning the final half of the program	26	21	20
Number of graduates	25	21	20
Graduation Rate (%)	96%	100%	100%
Graduation 3-year average: 98.5%			

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 Weaknesses in Program Outcomes: The most recent three-year average for placement rates (Table 8) is 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 2024	Class of 2023	Class of 2022
Number of graduates	25	21	20
Number of graduates who gain employment in the field or continued their education within one year of graduation	25	21	20
Graduation Rate (%)	100%	100%	100%
Graduation 3-year average: 100%			

[*] *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 2024	Class of 2023	Class of 2022
Number of students who began the "final half" of the program	26	21	20
Number of students who did not complete the program	1	0	0
Attrition Rate (%)	3.8%	0%	0%
Attrition 3-year average: 1.49%			

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
	Total Credits	**16**
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
	Total Credits	**16**
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
	Total Credits	**15**