Auburn University Samford Hall Tower Logo in orange and blue

# **ASSESSMENT REPORT**

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## B.S. Laboratory Science and B.S. Medical Laboratory Science

The undergraduate B.S. degrees in Laboratory Science (LBSC) and in Medical Laboratory Science (MLSC) are housed in the Department of Chemistry and Biochemistry under Clinical Laboratory Science. These B.S. degrees are designed to prepare students for careers in both clinical and non-clinical laboratory fields; and, for admission into graduate professional programs in the related sciences. During the 2016 - 2017 academic year, 69 undergraduate students were enrolled in either the Laboratory Science (or Laboratory Technology; from this point forward, no distinction will be made between LABT and LBSC) curriculum or the Medical Laboratory Science (or the Medical Technology; from this point forward, no distinction will be made between MEDT and MLSC) curriculum. Previously, 54 were enrolled in 2015, 53 in 2014 and 53 in 2013.

Students working towards a B.S. degree in Laboratory Science are not required to go to a Medical Laboratory Science (MLS) internship accredited by the National Accrediting Agency for Clinical Laboratory Science (NAACLS) if they choose **a non-clinical career** option; therefore, their last semester contains senior- level technical electives more focused on their choice of career positions. Those students working towards a

* 1. in Medical Laboratory Science, are preparing themselves for the professional phase of becoming a Medical Laboratory Scientist. This professional phase is part of their B.S. degree; and, involves completing an Auburn- affiliated NAACLS-accredited MLS program off-campus which includes a formal application and acceptance into their program. The completion of that MLS program will enable the student to graduate at Auburn University and then sit for the American Society of Clinical Pathology (ASCP) Board of Certification exam to enable them to work in a **clinical laboratory** as a certified Medical Laboratory Scientist.

Courses that are senior level courses in LBSC are only taught once per year so data may only be from one class that previous year.

## Student Learning Outcomes

### Specificity of Outcomes

SLO #1: Students obtaining a B.S. in LBSC or/and MLSC will demonstrate knowledge of normal and abnormal events within body systems.

Upon graduation, LBSC and MLSC graduates will be able to:

* + - 1. – Analyze normal blood smears and abnormal blood smears accurately.
      2. – Know and utilize normal reference ranges for all body system blood parameters clinically tested.
      3. – Understand proper scientific nomenclature.
      4. - Know the structures of antibodies and antigens; and, the consequences of the interactions of corresponding antigens and antibodies both in vivo and in vitro.
      5. - Determine patient status based on a clinical chemistry blood profiles relating to organ damage.

SLO #2: Students will be proficient in laboratory procedures involved in laboratory science investigations and all problem solving involved.

Upon graduation, students will be able to:

* 1. - Practice all Biosafety procedures required for the clinical safety of each healthcare employee, patient and visitor involved.
  2. - Assess quality control and quality assurance programs.
  3. – Create appropriate chemical solutions to use as reagents for specimen testing, calibration of instrumentation and quality control as necessary.
  4. - Analyze blood and body fluids accurately for specific parameters.
  5. – Use critical thinking skills to interpret or solve problems, which may also include real life patient case studies as well as forensics cases, math and or chemistry problems among others.

SLO #3: Students will show evidence of mastery of multiple parameter testing and investigations.

Upon graduation, students will be able to:

* 1. - Describe specific disease processes based on evidence-based analysis.
  2. - Prepare, correlate and present data to the appropriate audience.

### Comprehensive Outcomes

The learning objectives and subsequent outcomes are comprehensive and are created by the Clinical Laboratory Science (CLS) faculty through a series of brainstorming sessions. Our professional organizations, ASCP (American Society of Clinical Pathology – who creates the certification exam) and NAACLS (who evaluates and certifies MLS programs), list numerous competencies that MLS students must know and complete to pass the certification exam. The aim was to develop learning objectives in line with the potential certification standards required by both ASCP and NAACLS to ensure students are adequately prepared for the MLS internship and thus the certification and skills necessary to become a successful Medical Laboratory Scientist.

### Communicating Student Learning Outcomes

The outcomes listed above have been distributed to CLS faculty via email and discussed at faculty meetings. They are not in their final form and will be worked on each year to hone in on that which is necessary to gain from the college experience and that which can wait to be acquired in the hospital or laboratory setting of their career.

1. Curriculum Map

SLOs are taught in at least one course as indicated by the curriculum map below. The rankings (0 – V) indicate to what extent the SLOs are brought up, taught or manipulated by students through assignments, lectures, exams, etc. in the courses indicated.

#### Curriculum map for LBSC/MLSC courses from the AU curricula of each.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SLO and Specific Topic** | **LBSC 2010** | **LBSC 4010** | **LBSC 4050** | **LBSC 4250** | **MATH 1610** | **BIOL 1020/1** | **CHEM 1030/1** | **CHEM 1040/1** | **CHEM 2070/1** | **CHEM 2080/1** | **BCHE 5180/1** | **BIOL 2500** | **BIOL 2510** | **BIOL 3000** | **BIOL 3500** | **BIOL 5200** |
| ***SLO 1.1: Blood smear analysis*** | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | V | 0 |
| ***SLO 1.2:***  ***Reference ranges*** | 1 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| ***SLO 1.3:***  ***Scientific nomenclature*** | 2 | 2 | 2 | 2 | 0 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| ***SLO 1.4:***  ***Antigen- antibody knowledge*** | 1 | 1 | 2 | 0 | 0 | V | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 |
| ***SLO 1.5:***  ***Determine patient status*** | 1 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| ***SLO 2.1:***  ***Biosafety procedures practice*** | 2 | 2 | 2 | 2 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 3 | 2 |
| ***SLO 2.2:***  ***Quality control and assurance*** | 1 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | V | 1 |
| ***SLO 2.3:***  ***Create chemical solutions*** | 2 | 2 | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 |
| ***SLO 2.4:***  ***Analyze body fluids*** | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| ***SLO 2.5: Use***  ***critical thinking skills*** | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 |
| ***SLO 3.1:***  ***Describe disease process*** | 1 | 2 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 2 | 2 |
| ***SLO 3.2:***  ***Conduct proper testing*** | 2 | 2 | 2 | 2 | 0 | 0 | 2 | 2 | 2 | 2 | 0 | 0 | 0 | 1 | 1 | 2 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

0 = no coverage; 1 = some coverage; 2 = extensive coverage; V= variable depending on instructor

## Measurement

### Outcome-6. Measure Alignment

All assessment data collection efforts occur in the senior-level Laboratory Science courses (LBSC 4010

–Hematology; LBSC 4250 – Clinical Biochemistry and Instrumentation; and, LBSC 4050 – Parasitology and Clinical Immunohematology) which can be taken before or after one another since they do not preclude each other. LBSC 2010 is an introductory course designed to introduce and practice laboratory math, oral presentations and sample patient data for each department but does not spend much time teaching writing, oral communication nor major concepts.

Until 2013, there has only been one instructor for over 20 years who teaches each of these LBSC lecture courses and lab courses for all advisees in this major. As a result, each of the LBSC courses is only offered once per year. Some data collection is only collected one semester per year and presented the next summer. As the new lab manager was hired in 2013, parts of the lab courses eventually were given to the lab manager but some not fully until 2015 and 2016. As the duties of each course have been split between the instructor and the lab manager, the students have responded well.

Table of Measures for Outcome assessed, the frequency taught, the type of measure, data collection origin and the desired results

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Measure** | **Outcome(s) Assessed** | **Frequency** | **Type** | **Data Collection** | **Desired Results** |
| LBSC 4010  Lab Final and/or other exams for specific questions. | 1.1, 1.2, 1.3, 1.5 | Every fall semester, data collection for assessment is done | Direct measure | Course embedded | Students should average 70% or higher to be competitive in getting an MLS  internship. |
| LBSC 4010 Oral  presentation of a blood disease measured with oral rubric (Appendix B) | 2.5, 3.1, 3.2 | Every fall semester, data collection for oral assessment is done | Direct measure | Course embedded | Students should average 70% or higher to be competitive in getting an MLS  internship |
| “Case study” packet of homework in LBSC 4050 | 2.5 | Every spring semester, data collection for assessment is done | Direct measure | Course embedded | Students should average 70% or higher to be competitive in getting an MLS  internship |
| Used “Antibody Unknown” workup from a patient performed during last 2 weeks of semester that must be done by the student in lab with no help but with the lab manager present | 1.4, 2.5 | Every spring semester, data collection for assessment is done | Direct measure | Course embedded | Students should average 70% or higher to be competitive in getting an MLS  internship |
| Lab reports (LBSC 4050) and  final exam questions (LBSC 4010) | 1.3 | LBSC 4050 data collection for assessment is done every spring.  LBSC 4010 data collection is done every fall | Direct measure | Course embedded | Students should average 70% or higher to be competitive in getting an MLS  internship |
| Daily practice in all 3 courses’ laboratory sessions every time a “wet” lab is performed. Not a quantitative form of measure just yet with results, but | 2.1, 2.3, 2.5 | Data collection is done every fall semester for LBSC 4010 and  every spring semester for LBSC 4050 and  LBSC 4250.  Wet labs are taught with each | Indirect measure | Course embedded | NA to have a percent correct with no quantitative measure. |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| correct procedure is expected every time. Laboratory instructor calls it out loud if not done correctly.  Errors occurring in lab may show up in written lab reports but also may be overlooked if written up correctly. |  | course one time or 2x per week. This data collection is limited to non- quantitative measurement only (observation) |  |  |  |
| Homework graded as worksheet and used average percent correct. | 2.2, 2.4 | Data collection is done every fall semester for LBSC 4010 and  every spring semester for LBSC 4050 and  LBSC 4250 | Direct measure | Course embedded | Students should average 70% or higher to be competitive in getting an MLS  internship |
| LBSC 4250  questions on specific exams. | 1.5, 2.2 | Data collection is done every fall semester for LBSC 4010 and  every spring semester for LBSC 4050 and  LBSC 4250 | Direct measure | Course embedded | Students should average 70% or higher to be competitive in getting an MLS  internship |

### 7. Data Collection

For some SLOs, individual faculty members collect data for their courses, usually in the form of exam questions as seen first in a specific exam and then the same topic is revisited on the final exam.

Communication skills are assessed throughout the student’s curriculum in the LBSC courses, starting with the introductory course to Laboratory Science, LBSC 2010, in which the students give a 3- minute oral report during the first weeks of class to give them one experience of public speaking. The experience is the important part and, therefore, a rubric is not used. During the senior level courses, however, rubrics are used to assess both written and oral communication skills. The faculty member and/or teaching assistants complete the rubric, which is returned to the student to hopefully improve their future performance. All scores are reported to the assessment coordinator at the end of the semester.

Class projects also assess students’ abilities in BIOL 5200 and LBSC 4250. In BIOL 5200, the professor required a poster session in which the student chose a topic related to the course, researched the subject, made a poster and completed a poster session in which other professors and students asked them questions. No results are available for this activity as the course is in another department but the experience is a very positive and excellent one for seniors potentially continuing on to a higher degree. “Unknown” workups are also a part of 2 of the students’ courses: BIOL 5200 and LBSC 4050.

These are projects in which the student is given an unknown substance that must be identified based on lab tests they perform on their own, utilizing skills and knowledge they have gained from the lab course as well as the lecture course. It is the critical thinking part of both of these courses. This score will be utilized for the LBSC 4050 since we have access to that data.

A rubric for short orally-presented case studies (LBSC 4250) is used to help identify areas where a student’s performance needs improving (Not included in this report, however). Each time they are

graded on a short case study presentation, they receive notes from the instructor and lab manager on ways to improve for the next short case study presentation. They are to use PowerPoint to present the case study, ask questions of the students while presenting and then conclude their thoughts about the case showing how and why they obtained the answer they did. These short oral presentations are worth much less than the Blood disease presentation in Hematology, LBSC 4010. These smaller presentations give the students a chance to “practice oral presentations and organization”, whether they do these short ones before the big presentation in Hematology or after.

One senior assessment utilized is the Hematology (LBSC 4010) blood disease oral presentation as previously mentioned. This oral presentation is graded, anonymously, by several peers selected by the instructor; several lab teaching assistants; the lab manager and the instructor; however, the instructor is the only one to see the other graders’ comments and grades before taking these into account to give the final grade. All comments are added by the instructor to the returned grade sheet, at the instructor’s discretion, so that the constructive comments may be viewed by the presenter.

## Results

### Reporting Results

* + 1. **SLO #1.1** – **“normal - abnormal blood smears”** are presented in the following table. Data from this table below was randomly selected from a 100-question lab final exam. This is data collected for 2 years: 2014 and 2016.

**Table of data collected for SLO #1.1 for 2014 and 2016**

|  |  |  |
| --- | --- | --- |
| **LBSC 4010 Lab final**  **↓** | **n= 16** | **n = 20** |
| **Year →** | **2014** | **2016** |
| **Question # - unknown Identified**  **↓ ↓** | **(% correct)** | **(% correct)** |
| **10** - lymphocyte *- normal* | 81 | 65 |
| **13** - myeloblast | 62.5 | 85 |
| **29** - DNA | 75 | 90 |
| **80** - sedimentation rate | 56 | 40 |
| **1** - mature lymphocyte | 75 | 90 |
| ***Normal*** - **Avg. % correct** | **69.9%** | **74%** |
|  |  |  |
| **5** - plasma cell *– abnormal* | 75 | 75 |
| **14** - Acute Myelocytic Leukemia | 81 | 95 |
| **27** - Malaria | 62.5 | 20 |
| **36** - Acute lymphocytic leukemia | 62.5 | 50 |
| **48** - Dohle Bodies | 94 | 55 |
| **79** - Acute Myelomonocytic Leukemia | 69 | 65 |
| ***Abnormal***- **Avg. % correct** | **74%** | **60%** |
| ***Overall Total avg. % correct*** | **71.5** | **67** |

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* + 1. **SLO #1.2**. Reference Range Data based on specific exam questions that address this topic. Percentage represents the average correct score on knowing and or using Normal Reference ranges and how to interpret results as high or low. Data is from fall 2014 and fall of 2016.

**Table of SLO # 1.2 - Reference Ranges - data collected (2014 and 2016) in LBSC 4010 varying exams.**

|  |  |  |
| --- | --- | --- |
| **LBSC 4010** | **n= 16** | **n = 20** |
| **Year →** | **2014** | **2016** |
| **Exam↓ Question # ↓** | **(% correct)** | **(% correct)** |
| **Final exam** 50 | 93.8 | 100 |
| 51 | 81.3 | 85 |
| 52 | 81.3 | 80 |
| 66 | 75 | 80 |
| **Exam 1** 1 | 100 | 90 |
| 13 | 88.2 | 40 |
| 15 | 100 | 95 |
| 16 | 23.5 | 20 |
| 18 | 82.4 | 75 |
| 22 | 94.1 | 90 |
| 45 | 88.2 | 85.7 |
| **Exam 2** 3 | 61.5 | 90.5 |
| 35 | 38.5 | 90 |
| 58 | 92.3 | 100 |
| ***Avg. % correct answers*** | **76.4%** | **80.4%** |

* + - 1. **SLO # 1.3 - proper use of scientific nomenclature -** using lab report rubric (Appendix A) and final exam questions

**Table of results for SLO #1.**3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course→** | LBSC 4050  n = 19 | LBSC 4050  n = 16 | LBSC 4010  N = 17 | LBSC 4010  N = 21 |
| **Year→** | 2014 | 2016 | 2014 | 2016 |
| **Lab report Section #** **↓** | % correct – | % correct – | % correct – | % correct – |
| #1.3 |  |  |  |  |
| ***Avg. % correct*** | **71** | **95** | NA | NA |
| **Final exam question # ↓** |  |  |  |  |
| 2 | NA | NA | 87.5 | 95.0 |
| 9 |  |  | 31.3 | 30 |
| 24 |  |  | 62.5 | 80 |
| 36 |  |  | 100 | 85 |
| 54 |  |  | 50 | 55 |
| 68 |  |  | 81.3 | 70 |
| 77 |  |  | 75 | 70 |
| 80 |  |  | 87.5 | 90 |
| ***Avg. % correct*** |  |  | **72** | **72** |

* + - 1. **SLO # 1.4 – “Ag – Ab Reactions and consequences in vivo and in vitro”.** Use lab report rubric (Appendix A)

– use total percent to assess this SLO .

**Table of SLO # 1.4 results**

|  |  |  |
| --- | --- | --- |
| **Course→** | **LBSC 4050** (**n = 19)** | **LBSC 4050** (**n = 16)** |
| **year→** | **2014** | **2016** |
| **Lab Report section ↓** | **% correct** | **% correct** |
| 2.2 | 76 | 98 |
| 2.3 | 74 | 97 |
| 3 | 86 | 96 |
| ***Avg. % correct*** | **79** | **97** |

* + - 1. **SLO # 1.5 – “patient’s status – results indicating organ damage”.** Data based on specific clinical chemistry/organ profile questions from the final exam

**Table of SLO #1.5 results.**

|  |  |  |
| --- | --- | --- |
| **Course→** | **LBSC4250 n = 18** | **LBSC 4250**  **n = 11** |
| **Year→** | **2014** | **2016** |
| **Question #**  **↓** |  |  |
| **2** | 50 | 27.3 |
| **3** | 77.8 | 72.7 |
| **4** | 66.7 | 45.5 |
| **15** | 66.7 | 81.8 |
| **16** | 72.2 | 81.8 |
| **21** | 94.4 | 72.7 |
| **28** | 55.6 | 45.5 |
| **47** | 77.8 | 45.5 |
| **50** | 66.7 | 63.6 |
| **51** | 55.6 | 54.5 |
| **Avg. % correct** | **68.4** | **59** |

* + - 1. **SLO #2.1 – “Practice in Lab setting biweekly and has knowledge of Biosafety procedures for everyone involved in a clinical setting” –** Unable to quantitatively assess a daily requirement in lab. We did try to use the Biosafety training percent from the online exam given by AU Occupational Safety and Health Program (OSAH) Biosafety department on campus for a quantitative comparison. Getting 100% on the exam does not guarantee compliance towards safety in every wet lab but it does give a measurable means to make sure the student knew the information.

**2016 Pass rate = 100%** as given by the Auburn University Occupational Safety and Health Program - Online Biosafety training. This OSAH online training was added fall 2016 – students are required to send a screen shot of their score on that exam before they are allowed to work in lab. This online training was added to our 3-hour training on Biosafety that we do in our lab prior to any wet lab as well. No results for 2014 as this online OSAH training exam was not implemented by us until 2015.

* + - 1. **SLO # 2.2 – Knowledge of Quality control and assurance program.**

LBSC 2010 during fall 2016 – Homework worksheet grade Not implemented until fall 2015, so no data for 2014**.**

**Average % correct in 2016 = 77%.**

**SLO #2.2 –– “Quality control and assurance”** was also the topic of specific questions for exam one as seen in the table below.

**Table of SLO #2.2 results**

|  |  |  |
| --- | --- | --- |
| **Ex. 1- Course→** | **LBSC 4250 (n=18)** | **LBSC 4250 (n=11)** |
| **Year→** | **2014** | **2016** |
| **Question #↓** |  |  |
| 7 | 47.1 | 16.7 |
| 9 | 29.4 | 50 |
| 13 | 100 | 83.3 |
| 20 | 76.5 | 91.7 |
| 21 | 100 | 91.7 |
| 22 | 88.2 | 91.7 |
| 23 | 82.4 | 75.0 |
| **Avg. % correct** | **74.8** | **71.4** |

* + - 1. **SLO # 2.3 –** Indirect-measured data – During Labs, students are required to reconstitute controls, make daily bleach solutions, prepare calibrators, standards and dilutions. This is an observed assessment seen in LBSC 2010, 4010, 4050 and 4250 in each “wet” lab. Lab outcomes, calibrators and controls are based on each individuals’ ability to perform this SLO. This is a required but non-quantitative measurement.
      2. **SLO # 2.4 – “Analyze blood and body fluids for specific parameters”.**

LBSC 4250 during spring 2016 – Glucose assay homework for 2016 and n = 12. New assay in 2016 so not done in 2014.

**Average % correct in 2016 = 71%**

* + - 1. **SLO # 2.5 –“Use critical thinking skills to interpret or solve problems, which may also include real life patient case studies”**. Used a homework pack of 10 case studies due last day of class in LBSC 4050. Also used an unknown antibody that had to be determined on their own time in the lab by themselves with the lab manager present.

**Table for SLO 2.5 results**

|  |  |  |
| --- | --- | --- |
| **LBSC 4050** | **n = 19**  **2014** | **n = 16**  **2016** |
| Homework pack of 10  Patient case studies |  |  |
| **Avg. % correct** | **70** | **75** |
| Antibody Unknown |  |  |
| **Avg. % correct** | **75** | **79** |

* + - 1. **SLO #3.1 – “Describe specific disease processes based on evidence-based analysis”.** Graded using sections of the Oral presentation rubric (Appendix B – Item 2 Evaluation Tool).

**Table of SLO #3.1 Results**

|  |  |  |
| --- | --- | --- |
| **Course→** | **LBSC 4010**  **n =16** | **LBSC 4010**  **n = 20** |
| **Year→** | **2014** | **2016** |
| **Oral report section↓** |  |  |
| “Content”  Avg. % Correct | 95 | 95.6 |
| “Ability to field questions”  Avg. % Correct | 96.7 | 94.2 |
| “Overall presentation”  Avg. % Correct | 95.5 | 96.8 |
| **Total Avg. %** | **95.7** | **95.5** |

* + - 1. **SLO 3.2 – Prepare, correlate and present data to the appropriate audience**. Used certain sections of the Oral presentation rubric (Appendix B) for LBSC 4010.

**Table of SLO #3.2 results**

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Course→** | **LBSC 4010** (**n =16)** | **LBSC 4010 (n=20)** |
| **Year→** | **2014** | **2016** |
| **Oral report section↓** |  |  |
| “Voice/confidence levels”  Avg. % Correct | 92 | 92.25 |
| “PowerPoint slides”  Avg. % Correct | 97.3 | 97.6 |
| “Overall presentation” Avg. % Correct | 95.5 | 96.8 |
| **Total Avg. %** | **95** | **95.55** |

### Interpreting Results

**Table representing Interpretation of Results of each SLO and its aligned measure. Interpretation notes are also included.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Student Learning Outcome** | **Measure** | **Results** | **Desired Result** | **Interpretation** | **More interpretation notes** |
| 1.1 – Blood Smears | Lab Final Questions | 2014 – 71.5%  2016 – 67% | Avg. 70% or higher  In order to be competitive in obtaining an internship | If truly using the avg. percent as our guideline, then we are almost meeting our desired result | One possible interpretation as to why it decreased is our implementation of new techniques for teaching blood diseases.  We added too many exercises to complete which may have hurt their  learning, thus the lower avg. percent of 67%. Students may have been  overwhelmed. |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1.2 – Reference ranges | Specific exam questions | 2014 – 76.4%  2016 – 80.4% | Avg. 70% or higher | Faculty are quite pleased with increase in avg. % But also the avg.  % is much higher than 70% | This is extremely important for the future of understanding and preparing for the certification exam. |
| 1.3 – Scientific nomenclature | Specific exam questions  Or  Lab reports in LBSC 4050 | 2014 – 72%  2016 – 72% OR  2014 – 71%  2016 – 95% | Avg. 70% or higher  Avg. 70% or higher | Faculty are pleased with meeting the Avg.  % and higher and performing much better on the lab reports in 2016. | The new position of lab manager is now becoming more defined as to the duties; and so, students are more in tune as to what is required of them and doing better.  The LBSC 4050  lab is becoming quite organized. |
| 1.4 – Antigens, antibodies and interactions | Used Lab report sections dealing with this topic | 2014 – 79%  2016 – 97% | Avg. 70% or higher | 70% is being met and the faculty are quite pleased with the increase in Avg. % in 2016. | Grading of reports is now totally a part of the lab manager duties. We may need to look at both the rubric and  results to why such a drastic change |
| 1.5 – Patient status via blood  profiles | Specific exam questions | 2014 – 68.4%  2016 – 59% | Avg. 70% or higher | This SLO has only been implemented since 2014. The format of the lecture requirements has changed 2 times in 3 years to find the best method for student learning. | As the need for case-based learning has become a necessity at the university level, students are changing their way of learning it as well. This drop in Avg. % may be a reflection of trying to find a perfect fit to teach it and then  learn it. |
| 2.1 – Biosafety practice and knowledge of  Biosafety procedures for everyone involved in a clinical setting | Daily practice in all 3 courses’ laboratory sessions every time a “wet” lab is performed.  Not a quantitative form of measure just yet with results. | NA.  Observation but if using the Biosafety training course online for AU OSAH –  100% pass  rate - 2016.  Not implemented until 2016. | Avg. 70% or higher | Percent if using that exam is excellent but are they practicing safety procedures daily? Hard to judge | More brainstorming will have to be done to find a suitable way to assess their practice of procedures that assure safety at all times in lab. |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2.2 – Quality control  assessment | Homework graded deals specifically with this  OR  Specific exam questions LBSC 4250 | 2014 – NA  2016 – 77%  OR 2014 – 74.8%  2016 – 71.4% | Avg. 70% or higher  Avg. 70% or higher | Faculty are pleased with knowledge and experience gained for this outcome. | This practice should be a routine part of every lab report and we may include that in the future. |
| 2.3 – Chemical solutions | Daily practice in all 3 courses’ laboratory sessions every time a “wet” lab is performed.  Not a quantitative form of measure just yet with results | NA -  Observation only by the instructor and lab manager. | Avg. 70% or higher | While this is a necessary outcome, not doing it properly will affect lab results for lab that day and thus be seen in the lab report. | The faculty will need to brainstorm a way to measure if this is done correctly in the future. |
| 2.4 – Analyze body fluids | Homework graded as worksheet and used average percent correct. | 2014 – NA  2016 – 71% | Avg. 70% or higher | 71% is above the 70% requirement but certainly analyzing body fluids in testing should be closer to 100% | These values should be closer to 100% but this is one of the topics we should brainstorm on how to improve |
| 2.5 – Critical thinking skills | Case study packet of homework in LBSC 4050. OR  Used “Antibody Unknown” workup from a patient in LBSC 4050 during last  2 weeks of semester performed solely by the student in lab with no help | 2014 – 70%  2016 – 75%  2014 – 75%  2016 – 79% | Avg. 70% or higher  Avg. 70% or higher | Meets desired results  Meets desired results.  This concept is extremely important for blood recipients and represents the student’s second experience at solving this puzzle | This may be the students’ first experience in pulling results together to aid in diagnosis  Working alone to solve this puzzle is a difficult requirement but this experience makes the student a more desirable candidate for the clinical internship |
| 3.1 – Describe Disease process  based on evidence | Oral presentation of a blood disease measured with oral rubric (Appendix B) | 2014 – 95.7%  2016 – 95.5% | Avg. 70% or higher | Excellent results and exceeds desired results. | This feedback shows the CLS faculty how all of the activities prior to this one at the end of LBSC 4010 have greatly prepared most students for this presentation. |
| 3.2 – Organized and presented  data to | Oral presentation of a blood disease measured with oral rubric | 2014 – 95%  2016 – 95.5% | Avg. 70% or higher | Excellent results and exceeds desired results | This feedback shows the CLS faculty how all of the activities |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| appropriate audience | (Appendix B) |  |  |  | prior to this one at the end of LBSC 4010 have greatly prepared most students for this presentation |

### Communicating Results

Results are shared with the faculty via email and discussed at faculty meetings. Graded rubrics for course assignments are shared with students to provide feedback for improving their performance.

## Use of Results

### Purposeful Reflection and Action Plan

During the preparation of this assessment report, I noticed that this process should be more structured and well documented. Hence we plan to hold “Quality Improvement” faculty meetings in the future to review both future assessment results as well as monitor the effectiveness of changes made in the curriculum.

Overall, the assessment data show that the students averaged the 70% needed in most cases to deem that the student was acceptable to a MLS internship program, not provided for on campus. That also means about 1/3 were much higher and about 1/3 were much lower. However, in many cases, 70% seems too low for measurement of patient blood parameters. (If it were my blood, I’d want 100% accuracy every time). Since this is a curriculum in which the student is taught not only the didactic knowledge but the textbook knowledge and common sense in testing blood parameters and their coinciding with other parameters, then we would think this testing must be more accurate and precise with each test performed. However, the internship gives the students the time and opportunity to understand why accuracy and precision are so important to the future of each patient tested, not only as a percent on an exam score. The professional, ethical and decision-making skills of each student are developed as they encounter real patients in a clinical setting on a day to day basis and over a long period of time in the ‘real’ world. It might be interesting to go backwards and send a survey to our clinical internship sites and ask what our students are lacking, as they are coming from Auburn University versus other colleges sending their students to that same internship site.

So as clinical educators, we must strive to increase the percent of those correct in every aspect of testing or at least make the students aware of how important these measurements of outcomes and learning the outcomes are. We also need to use results from this assessment to identify the weaker areas for the students. Each instructor will be expected to modify course content or delivery to improve performance in these weaker areas.

Some specific changes will be considered for LBSC 4010 - Hematology and for LBSC 4250. In LBSC 4010 before we teach next fall, we will brainstorm just how many exercises or activities will be given so as not to overwhelm the student with how much they have to do but how well they did each one. We will discuss decreasing the number of lab reports due each semester and instead discuss the quality of the ones done and find a way to measure the outcome with an exercise equal to the task in lab. Also when speaking of blood disease states and learning the physiology of each and how it affects the patient, more attention to understanding how the patient feels on the first couple of diseases will be looked into so as to generate more compassion towards getting accurate and precise results for the patient’s sakes. This will generate more discussions for the other LBSC courses as well.

We will also discuss the rubrics for LBSC 4250 for short case studies and implement one that will teach the student how to make these case studies more effective. We will, finally, go through this report looking for a more organized fashion to note what the student needs to focus on and ways to get there without so many activities. The amount of activities now seems to overwhelm students and does not always equal more learning.

Submitted by Kathryn Milly West, MS, MT(ASCP)

***Appendix A***

***Laboratory Science - Written Lab Report Rubric***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Report Component** | **Evaluation criteria** | | | | |  |
| **Excellent** | **Good** | **Acceptable** | **Fair** | **Poor** | **Score** |
| INTRODUCTION  Must include:   1. Test name and purpose; 2. Importance; 3. Justification; 4. Clear definition with correct clinical terminology   (10 points) | All 4 main criteria must be met and completed properly (10) | At least 3 criteria must be met and done properly (9 - 8)  1)  2)  3)  4) \_\_\_  The ones marked need improvement | At least 2 criteria must be met and done properly  (7 - 6)  1)  2)  3)  4) \_\_\_  The ones marked need improvement | At least 1 criteria must be met and done properly (5 - 4)  1)  2)  3)  4) \_\_  The ones marked need improvement | No criteria were met or done properly (3 - 0) | /10 |
| PRINCIPLE OF TEST  Must include:   1. Concisely summarizes technique (without step by step procedure); 2. Adds chemical reactions if applicable; 3. Describes how each step contributes to final results. (20 pts) | All 3 main criteria must be met and completed properly  (20) | At least 2 criteria  must be met and done properly (19 - 16)  1)  2)  3)\_\_  The ones marked need improvement | At least 1 criteria must be met and done properly  (15 – 10)  1)  2)  3) \_\_  The ones marked need improvement | None of the criteria were met nor done properly  (9 - 5) | None of the criteria were done at all (4 - 0) | /20 |
| PROCEDURE | All 4 main criteria must be met and completed properly  (10 pts) | At least 3 criteria  must be met and done properly  (9 - 8) | At least  2 criteria must be met and done properly  (7-6) | At least  1 criteria must be met and done properly (5 – 3) | None of the criteria were done properly or at all  (2 - 0) | /10 |
| Must include: 1)Collection of specimens is indicated and how and materials used;  2) Reagents listed with lot and exp. Date; |
| 3)Pertinent precautions |  |  |  |
| listed with reasons why; | 1) | 1) | 1) |
| 4) Technique specifically | 2) | 2) | 2) |
| used is referenced with | 3) | 3) | 3) |
| page number. (10 pts) | 4) | 4) | 4) |
| The ones | The ones | The ones |
| marked need | marked need | marked need |
| improvement | improvement | improvement |

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|  |  |  |  |  |  |  |
| INTERPRETATION OF RESULTS  Must include:   1. Formulas for calculations are present, when indicated; 2. Data obtained is present and presented in an organized fashion; 3. Calculated results are accurate and presented in an organized fashion; 4. References ranges are present and presented in an organized fashion.   (10 pts) | All 4 main criteria must be met and completed properly  (10 pts) | At least 3 criteria  must be met and done properly  (9 - 8)  1) \_  2)  3)  4)  The ones marked need improvement | At least  2 criteria must be met and done properly  (7 - 6)  1)  2)  3)  4)  The ones marked need improvement | At least  1 criteria must be met and done properly (5-3)  1)  2)  3)  4)  The ones marked need improvement | None of the criteria were done properly or at all  (2 - 0) | /10 |
| DISCUSSION OF RESULTS; DATA ANALYSIS  Must include:   1. Results are compared to references ranges where applicable; 2. Possible errors are indicated and reasons for those errors theorized; 3. Differential diagnosis or additional testing/tests is/are indicated if applicable; 4. Real numbers from collected data are used within discussion and the accuracy is discussed while also using with proper units of measurement. (10 pts) | All 4 main criteria must be met and completed properly  (10 pts) | At least 3 criteria  must be met and done properly  (9 - 8)  1)  2)  3)  4)\_\_\_  The ones marked need improvement | At least  2 criteria must be met and done properly  (7-6)  1)  2)  3)  4)\_\_\_  The ones marked need improvement | At least  1 criteria must be met and done properly (5-3)  1)  2)  3)  4) \_\_\_  The ones marked need improvement | None of the criteria were done properly or at all  (2 - 0) | /10 |
| CLINICAL INDICATIONS OF TEST, PHYSIOLOGY, AND CONCLUSION  Must include:   1. Purpose for this test; 2. How it relates to a disease process or condition; 3. Other diseases with a high or low result and why; and, 4. The physiology of how this measurement affects an individual.   (20 pts) | All 4 main criteria must be met and completed properly (20) | At least 3 criteria must be met and done properly (19- 16)  1)  2)  3)  4)\_\_\_  The ones  marked need improvement | At least 2 criteria must be met and done properly  (15 – 12)  1)  2)  3)  4)\_\_\_\_  The ones marked need improvement | At least 1 criteria must be met and done properly (11 – 6)  1)  2)  3)  4)\_\_\_  The ones marked need improvement | None of the criteria were met nor done properly  (5- 0) | /20 |

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| GRAMMATICAL CORRECTNESS, REFERENCES, PLAGIARISM STATEMENT  Must include:   1. Evidence of good control of grammar, spelling, mechanics and sentence structure; 2. References cited correctly with at least one textbook reference, copied and highlighted; 3. Notebook follows class ”Guidelines for   Reports”;   1. Plagiarism statement included, signed, dated   (10 pts) | All 4 main criteria must be met and completed properly (10) | At least 3 main criteria must be met and completed properly  (9 – 8)  1)  2)  3)  4) \_\_\_  The ones marked need improvement | At least 2 criteria must be met and completed properly  (7 - 6)  1)  2)  3)  4)\_\_\_\_\_  The ones marked need improvement | At least 1 criteria must be met and completed properly  (5 - 3)  1)  2)  3)  4)\_\_\_  The ones marked need improvement | None of the main criteria were met or completed properly  (2 - 0) | /10 |

## Appendix B

**Item 2. Evaluation tool to assess oral communication ability in LBSC 4010.**

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| ***Criteria*** |  | ***Ratings*** | |  |  |  | ***Score*** |
| INTRODUCTION AND ORIGINALITY OF PRESENTATION:  Must include:   1. Name and define disease state concisely; 2. Presentation style creative? 3. Was audience engaged from the start? 4. Was there an original theme throughout presentation? (4 pts) | None of the main criteria were presented. (0.0 pts.) | One of the main criteria is present and accurate. (1.0 pts) | Two of the main criteria are present and accurate. (2.0pts.) | | Three of the main criteria are present and accurate. (3.0 pts) | All 4 main criteria are present and accurate. (4.0 pts) | /4 |
| CONTENT: Must include:   1. Information current? 2. Physiology, symptoms, lab tests, abnormalities explained well or at all; 3. Blood smears shown and explained; 4. Supporting case study presented, and, in learning way for the other students. (4 pts) | None of the 4 main criteria done properly (0.0 pts.) | One of the main criteria present and well done. (1.0 pts) | Two of the main criteria present and well done. (2.0 pts) | | Three of the main criteria present and well done. (3.0 pts) | All of the main criteria present and well done. (4.0 pts) | /4 |
| VOICE: Must include:  1) Clarity of voice during presentation; 2) Looking at and engaging with audience;   1. Speaking loud enough for all to hear over the HVAC in room; 2. Not using repetitive words with no meaning such as “um”, “uh”, “you know”, nor monotone nor talking too fast. (4 pts) | None of the 4 main criteria done properly (0.0 pts.) | One of the main criteria present and well done. (1.0 pts) | Two of the main criteria present and well done. (2.0 pts) | | Three of the main criteria present and well done. (3.0 pts) | All of the main criteria present and well done. (4.0 pts) | /4 |
| CONFIDENCE: Must include:   1. Eye contact with audience; 2. Body language of presenter is engaging; 3. Using notecards or reading directly from notes and not looking at audience; 4. Unsure of him or herself throughout presentation. (4 pts) | None of the 4 main criteria done properly (0.0 pts.) | One of the main criteria present and well done. (1.0 pts) | Two of the main criteria present and well done. (2.0 pts) | | Three of the main criteria present and well done. (3.0 pts) | All of the main criteria present and well done. (4.0 pts) | /4 |
| POWERPOINT PRESENTATION:  Must include:   1. Slides easy to read; easy on the eyes; 2. Transition from one slide to next is very smooth; 3. Flowing outline that is easy to follow, not wordy per slide but succinct; 4. Diagrams and images very clear and explained clearly with no distracting elements. (4 pts) | None of the 4 main criteria done properly (0.0 pts.) | One of the main criteria present and well done. (1.0 pts) | Two of the main criteria present and well done. (2.0 pts) | | Three of the main criteria present and well done. (3.0 pts) | All of the main criteria present and well done. (4.0 pts) | /4 |
| CASE STUDY:  Must include:   1. Teachable and applicable with ease in relating to disease covered; 2. Lab tests outlined or highlighted as to normal or abnormal and explained why each is important in that disease’ 3. Explanation of actual patient blood smear and why important to results; 4. Well organized summary of how the case is directly linked to that disease. (4 pts) | None of the 4 main criteria done properly (0.0 pts.) | One of the main criteria present and well done (1.0 pts) | Two of the main criteria present and well done (2.0 pts) | | Three of the main criteria present and well done (3.0 pts) | All of the main criteria present and well done (4.0 pts) | /4 |
| OUTLINE:  Must include:   1. Must be turned in earlier in class; 2. Format should introduction, body consisting of main points, and conclusion; 3. Only cue words necessary for each bullet of outline, not complete sentences but should be specific to a point; 4. Should follow important points in oral presentation that relates to disease. (4 pts) | None of the 4 main criteria done properly (0.0 pts.) | One of the main criteria present and well done. (1.0 pts) | Two of the main criteria present and well done. (2.0 pts) | | Three of the main criteria present and well done. (3.0 pts) | All of the main criteria present and well done. (4.0 pts) | /4 |

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| --- | --- | --- | --- | --- | --- | --- |
| WRITTEN REPORT/REFERENCES:  Must include:   1. Should follow outline directly but expand on each bullet; 2. Very concise; 3. Summary of oral presentation addressing what was covered orally; 4. References cited properly. (4 pts) | None of the 4 main criteria done properly (0.0 pts.) | One of the main criteria present and well done. (1.0 pts) | Two of the main criteria present and well done. (2.0 pts) | Three of the main criteria present and well done. (3.0 pts) | All of the main criteria present and well done. (4.0 pts) | /4 |
| ABILITY TO FIELD QUESTIONS ABOUT  THEIR TOPIC PRESENTED: Must include:   1. Poise in answering with confidence; 2. Secure body language to assure audience of research done on subject; 3. Calmness, relaxed mannerisms in choosing the correct words to prove point; 4. Thorough knowledge of the subject matter is indicated by words chosen for the answer to the questions. (4 pts) | None of the 4 main criteria done properly (0.0 pts.) | One of the main criteria present and well done. (1.0 pts) | Two of the main criteria present and well done. (2.0 pts) | Three of the main criteria present and well done. (3.0 pts) | All of the main criteria present and well done. (4.0 pts) | /4 |
| OVERALL PRESENTATION:  Must include:   1. Include time to present 20 minutes + 2 minutes; 2. Audience engaged by visual and oral presentation and originality; 3. Well organized and delivered with correct body language towards the audience while engaging them; 4. All parts previous and post-presentation follow and enhance oral presentation – Outline, written, PowerPoint slides. (4 pts) | None of the 4 main criteria done properly (0.0 pts.) | One of the main criteria present and well done. (1.0 pts) | Two of the main criteria present and well done. (2.0 pts) | Three of the main criteria present and well done. (3.0 pts) | All of the main criteria present and well done. (4.0 pts) | /4 |