



**2012- 2013**

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## **Annual Assessment Report**

**Submitted by  
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6/21/2013**

*ABSTRACT: An illustrated and concise summary of the assessment activities of Department of Clinical Laboratory Science, Wilsonville, Oregon. Every attempt has been made to report objective, accurate information. Any errors in reporting are not intentional, and the author welcomes correction when merited.*

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**I. Introduction**

- a. **HISTORY & LOCATION:** Established in 1933 by the Oregon Health and Science University (OHSU) in Portland, Oregon, the nationally accredited\* Clinical Laboratory Science program is a university-based, 3+1 program of study culminating in a BS in Clinical Laboratory Science. In 2001, administrative responsibilities for the program transferred to Oregon Tech through a master collaboration agreement between the two universities. Student diplomas identify both Oregon Tech and OHSU as the degree-granting institutions. In brief, Oregon's only baccalaureate CLS program retains the brand identity of OHSU with the administrative support of Oregon Tech. Today, the program is administered through the Department of CLS which resides on the Oregon Tech Wilsonville, Oregon campus. Here, students admitted to the last year of the degree program (professional year) take coursework that combines a rigorous competency-based science curriculum with community-sponsored clinical training. During the first four terms of the professional year, students complete course work in state-of-the-art-classrooms that include two well-equipped laboratory classrooms and an instrumentation room. Newly acquired (2012) instrumentation includes a Mindray BS-120 bench-top discrete and random access clinical chemistry analyzer and a bioMerieux Coag-A-Mate® MTX II analyzer with computer. Upon successful completion of the on-campus coursework, students are assigned to one or more program-affiliated laboratories to complete clinical training. 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 further develop discipline-specific competency under supervision of clinical instructors. Currently, the Department of CLS maintains affiliations with accredited laboratories in Oregon, Washington, Nevada, and Idaho. Program graduates are eligible to take the *American Society for Clinical Pathology (ASCP) Medical Laboratory Scientist (MLS)* national board certification examination and to pursue career opportunities in various laboratory settings including but not limited to medical, research, and public health.
- \* The Clinical Laboratory Science professional program is accredited by the *National Accrediting Agency for Clinical Laboratory Science (NAACLS)*, 5600 North River Road, Suite 720, Rosemont, Illinois 60018-5119. (773) 714-8880.
- b. **ENROLLMENT TRENDS:** For the six-year period 2007 - 2013, applicants to the program have more than doubled from 55 (2007) to 125 (2013). The number of admitted students has also significantly increased from 25 (2007) to 36 (2012), an increase of 30.5%. Notably, 2012 was the first year the program admitted students (3) from the OIT *Early Admission CLS Program (EACLSP)*. The program admitted 50 (49 regular admission plus 1 EACLSP, Klamath Falls) students for the 2013-2014 year.
- c. **RETENTION RATES:** The numbers of admitted students graduating (retention rate) from the CLS program is excellent over the last five years for which records are available (2007 - 2012). During this time, 120 students graduated of the 128 that were admitted for a retention rate of 93.8%.
- d. **RECENT NUMBER OF GRADUATES:** 26 (December 8, 2012).
- e. **EMPLOYMENT RATES & SALARIES:** Based on results of graduate exit surveys for the last four years (2009 - 2012) employment rates for program graduates are good. Approximately 74% (77/104) of surveyed respondents reported that they were employed within six months of graduation. Starting annual salaries for these employed graduates reportedly ranged from \$50,170 to \$51,584. As of March 2013, 22 of 26 (84.6%) graduates of the Class of 2012 reported employment. Annual salaries are reported to be between \$48,901 and  $\geq$  \$52,000.

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

### *Summary: Department and Advisory Board Review*

Beginning April 15, 2012, the CLS program experienced a change in leadership and organizational changes following the retirement of the program director and subsequent to the establishment of the Oregon Tech branch campus at Wilsonville. The impact of these changes on this report is primarily reflected in the few modifications to and the addition of terms, language, and descriptive content (including data), which conforms more to that used by the program's accreditation agency - NAACLS. The changes and modifications are in no way meant to detract from the essence of the established assessment formula to which the previous program leadership subscribed.

In accordance with program accreditation standards (NAACLS core standard VII D), a new program advisory board, composed of practicing professional laboratorians, academic professionals, scientific consultants, laboratory administrators, pathologists and other physicians, was selected and a meeting held in February 2013. At that time, the advisory committee was charged with the responsibility to provide input into the program and its curriculum in order to maintain current relevancy and effectiveness. Subsequently, a subcommittee on molecular technology curriculum was formed with Dr. Zahra Kashi, Kashi Clinical Laboratories, Inc., Portland, Oregon appointed as committee chair. Also, Dr. Kevin Foley, Regional Director of Clinical Chemistry and Toxicology, Kaiser Permanente NW Laboratories, Portland, Oregon strongly suggested a look at broadening the curriculum to include courses in informatics and coursework that would support tracks of study facilitating certification in discipline-specific areas (e.g., clinical chemistry, hematology, molecular diagnostics, etc.) The CLS program faculty reviewed the program purpose, objectives, and student learning outcomes at the beginning of fall 2012 term and affirmed the following:

### Faculty & Staff Commitment

We, the faculty and staff of the Oregon Tech • OHSU CLS program, as professionals and educators, 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 purpose, mission, objectives, and student learning outcomes (SLOs)*

#### **Program Vision**

Our vision is that the Oregon Tech • OHSU CLS program continue as a center of excellence in medical laboratory science education, graduating a Medical Laboratory Science workforce in demand.

#### **Program Mission**

The mission of the Oregon Tech • OHSU Clinical Laboratory Science Program is to educate, train, and graduate professionally competent and ethical individuals, committed to life-long learning, and who are prepared to meet current and future workplace challenges in medical laboratory science.

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Program Purpose, Objectives, and Student Learning Outcomes - continued

***Program Educational Objectives***

The CLS program expects to graduate individuals who:

- Are professionally competent;
- Possess a commitment to lifelong learning;
- Exhibit a sense of commitment to the ethical and humane aspects of patient care;
- Appreciate the need for research to develop knowledge of health, disease, healthcare management, and education;
- Recognize the role of the clinical laboratory scientist in the assurance of quality health care.

***Student Learning Outcomes***

Upon completion of the Oregon Tech • OHSU CLS a student will have had opportunity to acquire knowledge and skills, and develop professional attributes of a Medical Laboratory Scientist.

Consequently, at the time of graduation, students will be able to demonstrate:

- 1) Competency to perform a full range of testing in the contemporary medical laboratory encompassing pre-analytical, analytical, and post-analytical components of laboratory services, including hematology, chemistry, microbiology, urinalysis, body fluids, molecular diagnostics, phlebotomy, and immunohematology;
  - 2) Proficiency to problem-solve, troubleshoot, and interpret results, and to use statistical approaches when evaluating data;
  - 3) Professional conduct, respecting the feelings and needs of others, protecting the confidence of patient information, and not allowing personal concerns and biases to interfere with the welfare of patients.
  - 4) Administrative skills consistent with philosophies of quality assurance, continuous quality improvement, laboratory education, fiscal resource management, and appropriate composure under stressful conditions.
  - 5) Application of safety and governmental regulations and standards as applied to medical laboratory practice.
  - 6) Effective communication skill to ensure accurate and appropriate information transfer.
- c. For the 2012-2013 year, updates and changes in language and terms were made to the program purpose, mission, and objectives to reflect those used by the program's accreditation agency. One change to assessment of student learning outcomes was made for the 2012-2013 year. The CLS program faculty planned to assess effective communication in 2012-2013; however, it was postponed until the 2013-14 year to be in alignment with the Institutional Student Learning Outcomes (ISLO) schedule.
- d. Other learning opportunities available to students in the OIT • OHSU include the following:
- Membership and participation as a student member in the Oregon branch of the American Society for Clinical Laboratory Science (ASCLS);
    - 10 of 26 in the class of 2012 are ASCLS members
    - 4 of the 10 in the class of 2012 attended one professional meeting in 2012
    - 1 of 10 in the class of 2012 served as the Oregon student representative to the national ASCLS conference in Los Angeles, CA, July 17-21, 2012.
  - Student membership in the American Society for Clinical Pathology (ASCP)
    - 6 of 26 in the class of 2012 are ASCP members

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**III. Three-Year Cycle for Assessment of Student Learning Outcomes (SLO)**

The CLS faculty/staff confirmed the three-year assessment cycle listed in Table 1.

**TABLE 1** Assessment of Clinical Laboratory Science Program SLO by Year

Student Learning Outcomes	Assessment of SLO by Year			
	'09-10	'10-11	'11-12	'12-13
1. Competency to perform a full range of testing in the contemporary medical laboratory encompassing pre-analytical, analytical, and post-analytical components of laboratory services	X	X	X	X
2. Proficiency to problem-solve, troubleshoot, and interpret results, and to use statistical approaches when evaluating data	X	X	X	X
3. Professional conduct and ethical behavior, respecting the feelings and needs of others, protecting the confidence of patient information, never allowing personal concerns and biases to interfere with the welfare of patients		X		X
4. Administrative skills consistent with philosophies of quality assurance, continuous quality improvement, laboratory education, fiscal resource management, and appropriate composure under stressful conditions			X	
5. Application of safety and governmental regulations and standards as applied to medical laboratory practice	X	X	X	X
6. Effective communication skill to ensure accurate and appropriate information transfer	X			*

\*The CLS program faculty planned to assess effective communication in 2012-2013; however, it was postponed until 13-14 to be in alignment with the Institutional Student Learning Schedule

**IV. Summary of 2012-2013 Assessment Activities**

*Student Learning Outcome #1: Competency to perform a full range of testing in the contemporary medical laboratory encompassing pre-analytical, analytical, and post-analytical components of laboratory services, including hematology, chemistry, microbiology, urinalysis, body fluids, molecular diagnostics, phlebotomy, and immuno-hematology.*

- *SLO #1 required curricula listed in the curriculum map (table A) on page 19.*
- MEASURES OF SLO – *Direct Assessment: Testing* - at the end of fall term 2012 and again at the end of winter term 2013, program faculty assessed professional program students’ competency to perform a full range of testing (SLO #1) using: 1) clinical externship final examination results, and 2) the *American Society for Clinical Pathology (ASCP) Board of Certification (BOC) Medical Laboratory Scientist (MLS) exam* results. In the fall term of 2012, 26 externship students took final exams after completing clinical rotation sections which included: a) chemistry/Immunology, b) hematology/urinalysis, c) transfusion medicine, d) microbiology/serology, and e) specimen collection/safety. Students who did not pass an exam with a score of  $\geq 75\%$  the first time were permitted a second attempt. Also, within the first three months of graduation (December 2012) 27 graduates took the ASCP BOC. The ASCP BOC certifies through examination only those individuals who meet the academic and clinical prerequisites and who achieve acceptable performance ( $\geq$  scaled mean score of 400) on the examination. The exam is criterion-referenced and constructed to measure the competencies, including knowledge, skills, and abilities, linked to the content areas of practice in a contemporary medical laboratory. These areas are Blood Bank (BBNK), Chemistry (CHEM), Hematology (HEMA), Immunology (IMMUN), Laboratory Operations (LO), Microbiology (MICR), and Urinalysis (UA).
- SLO #1 ASSESSMENT DESIGN & DATA: assessment design and data (i.e., results of externship final exams and the ASCP BOC exam) are shown in tables 2 - 5.

**Table 2** SLO #1 Assessment Design

<i>Performance Criterion</i>	<i>Assessment Method</i>	<i>Measurement Scale</i>	<i>Min. Acceptable Performance</i>
Competently perform a full range of testing in the contemporary medical laboratory encompassing pre-analytical, analytical, and post-analytical components of laboratory services	Externship Final Exams	Relative (%)	$\geq 95\%$ of all 1 <sup>st</sup> time examinees pass section exams with scores $\geq 75\%$
	ASCP BOC Exam	Scaled Mean Score	$\geq 95\%$ of all 1 <sup>st</sup> time examinees pass the exam with scores $\geq 400$

**Table 3** CLS 470 Externship Final Exam Outcomes per Rotation Section (1<sup>st</sup> Time Examinees)

<i>Section</i>	<i>N</i>	<b>Observed LO</b>		<b>Threshold (%)</b>	<b>Mean Exam Score (%)</b>
		<b>No. Scores <math>\geq 75\%</math></b>	<b>No. Scores <math>&lt; 75\%</math></b>		
Chemistry/Immunology	26	26	0	100	88.2
Hematology/Urinalysis	26	26	0	100	93.2
Transfusion Medicine	26	25	1	96	84.6
Microbiology/Serology	26	26	0	100	94.9
Specimen Collection/Safety	26	26	0	100	85.6

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Summary of 2012 – 2013 Assessment Activities - continued

<b>Table 4 ASCP BOC Mean Scaled Scores by Subtest For First Time Examinees</b>							
	<b>BBNK</b>	<b>CHEM</b>	<b>HEMA</b>	<b>IMMU</b>	<b>LO</b>	<b>MICR</b>	<b>UA</b>
Program Mean Scaled Scores:	591	558	615	561	656	542	576
University Based Program Mean Scaled Scores	502	498	510	490	526	500	491

<b>Table 5 ASCP BOC Examination: First Time Examinees Statistics</b>			
	<b>OIT Program</b>	<b>Universities</b>	<b>National</b>
Number of Examinees	26*	2539	3679
Mean Scaled Score	580	501	499
Standard Deviation	91	103	106
Number Passing (Percent)	100	84.4	83.5
Number Failing (Percent)	0	15.6	16.5
Minimum Scaled Score Achieved	416	100	100
Maximum Scaled Score Achieved	811	857	898

\*Twenty-seven students took the exam, but only 26 agreed to release results to the program. \*\*

- STRENGTHS & WEAKNESSES IN STUDENT LEARNING**

Externship final exam outcomes: only one student in one rotation section (transfusion medicine) failed to pass the final exam the first time and required some remediation prior to taking the exam a second time. Following an additional week of remediation, the student was re-examined and passed the test with a score of 77%. Conclusively, the minimum acceptable performance for this assessment was met given that 97% (25/26) first time examinees taking the final exam for each clinical rotation section passed each exam with a score of  $\geq 75\%$ . This data indicates an improved performance compared to the previous year. Data for 2011 showed a total of 8 of 36 (22.2%) students failed to pass one or more externship final requiring re-examination.

ASCP BOC exam outcomes: Oregon Tech • OHSU CLS Program's mean scaled score for first time examinees is approximately 80 points higher than for both University-based programs' and National programs' mean scaled scores. Additionally, Program mean scaled scores for all sub-content areas are higher than those scores for the University and National Programs. Conclusively, the minimum acceptable performance for SLO #1 was exceeded given that 26 of 26 (100%) Program first time examinees passed the ASCP BOC with a score greater than or equal to 400. This was better than last year's (2011) 97% pass rate for first time examinees.
- RECOMMENDATIONS FOR IMPROVEMENTS:** faculty made no recommendations for improvements to the program. Detailed records on assessment activities are kept in the Office of the CLS Department Chair and may be found in individual student records maintained in the CLS program office.

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Summary of 2012 – 2013 Assessment Activities - continued

**Student Learning Outcome #2:** Proficiency to problem-solve, troubleshoot, and interpret results, and to use statistical approaches when evaluating data.

- *SLO #2 required curricula listed in the curriculum map(table B) on page 20.*
- **MEASURE OF SLO – Direct Assessment: Performance Appraisal** – At the end of fall term 2012, each program faculty assessed SLO #2 using externship students’ performance appraisal scores for problem recognition (PR)/ problem solving (PS) as determined by clinical site faculty using the CLS 470 Externship professional development evaluation tool. PR is defined as “recognizes errors in techniques or calculation results, and/or instrumentation malfunctions.” PS is defined as “determines course of action to solve problems and/or suggests correct solutions.” Students are evaluated by clinical site faculty after completing clinical rotation sections which included: a) chemistry/Immunology, b) hematology/urinalysis, c) transfusion medicine, and, d) microbiology/serology. To ensure consistent scoring and to minimize interpretation bias, the program faculty education coordinator instructed clinical sites’ faculty on the use of the tool.
- **SLO #2 ASSESSMENT DESIGN & DATA:** assessment design and performance appraisal PR & PS scores are shown in tables 6 and 7.

**Table 6** SLO #2 Assessment Design

<i>Performance Criterion</i>	<i>Assessment Method</i>	<i>Measurement Scale</i>	<i>Min. Acceptable Performance</i>
<b>PR</b> - recognizes errors in techniques or calculation results, and/or instrumentation malfunctions	CLS 470 Externship Performance Appraisal	3 = Exceeds expectations 2 = Meets expectations 1 = Min. expectations not met N/A = Not observed	No scores of 1
<b>PS</b> - determines course of action to solve problems and/or suggests correct solutions			

**Table 7** Externship Students’ Performance Appraisal Scores: Problem Recognition/Problem Solving

Student	<b>Students’ Professional Evaluation PR/PS Scores by Rotation Section</b>							
	Chemistry/Immunology (N=25)		Hem/UA (N=26)		Transfusion Med		Micro/Serology (N=25)	
	PR	PS	PR	PS	PR (N=23)	PS (N=25)	PR	PS
<b>Ave</b>	2.5	2.3	2.6	2.7	2.5	2.6	2.5	2.7

- **STRENGTHS & WEAKNESSES IN STUDENT LEARNING**  
No student received a score of 1 for either performance criteria, PR or PS, after completing rotations. Consequently, the minimum acceptable performance for this assessment was met.
- **RECOMMENDATIONS FOR IMPROVEMENTS:** faculty made no recommendations for changes to the curriculum associated with this SLO. Detailed records on assessment activities are kept in the Office of the CLS Department Chair and may be found in individual student records maintained in the CLS program office.



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Summary of 2012 – 2013 Assessment Activities - continued

**Student Learning Outcome #3:** Professional conduct and ethical behavior, respecting the feelings and needs of others, protecting the confidence of patient information, never allowing personal concerns and biases to interfere with the welfare of patients.

- *SLO #3 required curricula listed in the curriculum map(table C) on page 21.*
- **1<sup>st</sup> MEASURE OF SLO** – *Direct Assessment: Performance Appraisal* – At the end of fall term 2012, each program faculty assessed SLO #3 using externship students’ performance appraisal scores for professional conduct (PC) and Professional Integrity (PI) as determined by clinical site faculty using the CLS 470 Externship professional development evaluation tool. PC is defined as “maintains professional composure in stressful situations.” PI is defined as “maintains patient confidentiality and dignity.” Students are evaluated by clinical site faculty after completing clinical rotation sections which included: a) chemistry/Immunology, b) hematology/urinalysis, c) transfusion medicine, and, d) microbiology/serology. To ensure consistent scoring and to minimize interpretation bias, the program faculty education coordinator instructed clinical sites’ faculty on the use of the tool.
- **SLO #3 ASSESSMENT DESIGN & DATA:** assessment design and performance appraisal PC & PI scores are shown in tables 8 and 9.

**Table 8** SLO #3 Assessment Design

Performance Criterion	Assessment Method	Measurement Scale	Min. Acceptable Performance
PC - maintains professional composure in stressful situations	CLS 470 Externship Performance Appraisal	3 = Exceeds expectations 2 = Meets expectations 1 = Min. expectations not met N/A = Not observed	No scores of 1
PI - maintains patient confidentiality and dignity			

**Table 9** Externship Students’ Performance Appraisal Scores: Professional Conduct & Integrity

Student	Students’ Professional Evaluation PC/PI Scores by Rotation Section							
	Chemistry /Immunology (N=25)		Hem/UA		Transfusion Med		Micro/Serology (N=26)	
	PC	PI	PC (N=25)	PI (N=26)	PC (N=23)	PI (N=24)	PC	PI
<b>Ave</b>	2.6	2.1	2.6	2.0	2.7	2.0	2.6	2.1

- **STRENGTHS & WEAKNESSES IN STUDENT LEARNING**  
No student received a score of 1 for either performance criteria, Professional Conduct or Professional Integrity, after completing rotations. Consequently, the minimum acceptable performance for this assessment was met.
- **RECOMMENDATIONS FOR IMPROVEMENTS:** faculty made no recommendations for changes to the curriculum associated with this SLO. Detailed records on assessment activities are kept in the Office of the CLS Department Chair and may be found in individual student records maintained in the CLS program office.

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Summary of 2012 – 2013 Assessment Activities: SLO #3 - continued

- **2<sup>nd</sup> MEASURE OF SLO #3** – *Direct Assessment #2: Professional evaluation* (OIT Professionalism ISLO) – At the end of winter term 2013, program faculty met to discuss and rate the program’s graduating seniors using OIT’s professional evaluation form.
- **SLO #3 ASSESSMENT DESIGN & DATA** (Professionalism ISLO): assessment design and summarized data are shown in tables 10 and 11. Compiled student scores were submitted to the OIT Assessment Commission on 3/20/2013 for compilation into the OIT-wide data set for further analysis.

**Table 10** SLO #3 Professionalism ISLO Assessment Design

<i>Performance Criteria (12)</i>	<i>Assessment Method</i>	<i>Measurement Scale</i>	<i>Min. Acceptable Performance</i>
1. <b>Timeliness of work:</b> Student performs tasks in a timely manner. 2. <b>Quality-content:</b> Student performs assigned tasks according to course expectations. 3. <b>Quality-delivery:</b> Student work product is done in a professional manner. 4. <b>Attitude toward feedback:</b> Student accepts feedback appropriately. 5. <b>Attitude toward assigned tasks:</b> Student accepts & carries out tasks with positive attitude. 6. <b>Punctuality:</b> Student arrives on time or gives appropriate notification. 7. <b>Attendance:</b> Student regularly attends classes/meetings or gives appropriate notification. 8. <b>Academic integrity:</b> Student follows OIT Student Conduct Code. 9. <b>Interpersonal skills:</b> Student interacts appropriately with others. 10. <b>Knowledge of classroom policies &amp; procedures:</b> Student is aware of and follows classroom policies & procedures. 11. <b>Work ethic:</b> Student demonstrates effort and hard work. 12. <b>Appearance:</b> When required, student demonstrates appropriate professional appearance	OIT Professional Evaluation Form	Blank = Unable to assess 0 = Does not meet faculty expectations 1 = Meets faculty expectations 2 = Exceeds faculty expectations	No scores of 0

**Table 11** Data Summary: OIT Professionalism Assessment

Score Stats	Performance Criteria											
	1	2	3	4	5	6	7	8	9	10	11	12
N = 26												
Mean	1.4	1.4	1.4	1.4	1.3	1.4	1.3	1.4	1.3	1.3	1.5	1.3
Range	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	1 - 2	0 - 2	1 - 2	1 - 2	1 - 2

- **STRENGTHS & WEAKNESSES IN STUDENT LEARNING** – Mean scores for performance criteria showed faculty expectations for student professionalism were met. However, 1 of 26 students received a score of 0 for ‘interpersonal skills’. Faculty believed this a non- significant finding. The student in question was described as older, married, ‘grumpy’, not overtly friendly, and preferring minimal interaction with classmates. To the student’s credit, he interacted well and respectfully with faculty and staff. Consequently the faculty concluded that the minimum acceptable performance for this assessment was met.

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- Summary of 2012 – 2013 Assessment Activities: SLO #3 - continued

The following comment was included with the data submitted to the Assessment Commission:

“As a nationally accredited program, the CLS program has established academic and non-academic standards of performance that students are expected to meet in order to successfully complete the CLS degree. Professionalism is taught and modeled throughout the curriculum of the program. Students are evaluated for their professionalism in every didactic class, every term, as well as by their clinical mentors at the end of every clinical rotation during their 4-month externship. Consequently, program faculty believed that all 12 attributes listed in this ISLO are areas of strength addressed through the curriculum.”

- RECOMMENDATIONS FOR IMPROVEMENTS: faculty made no recommendations for changes to the program curriculum associated with this ISLO. Also, because so few program students were OIT students before program admission, faculty made no recommendations for changes to OIT general education requirements. Detailed records on assessment activities are kept in the Office of the CLS Department Chair

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Summary of 2012 – 2013 Assessment Activities: SLO #3 - continued

- **3<sup>rd</sup> MEASURE OF SLO #3 – Direct Assessment #3: Student Work (OIT Ethics ISLO)** – Faculty assessed students’ understanding and application of ethical principles in CLS 462 Laboratory Management during the summer term 2012 using student work: a written assignment. Students were provided the program’s professional code of ethics, an ethics scenario, and instructed to complete a written assignment using the code and scenario. Specifically, each student was asked to list, with explanation and examples, three code provisions that he/she thought important. Lastly, students were asked to read the ethics scenario and answer four questions: 1) what are the ethical issue(s); 2) who are the people involved in the issue(s) and what are their view points; 3) what are the possible/alternative approaches to the issue(s) approaches; and, 4) which one approach do you think is best and what are its benefits and risks? Students’ papers were evaluated using a rubric.
- **SLO #3 ASSESSMENT DESIGN & DATA (Ethics ISLO):** assessment design and summarized data are shown in tables 12 and 13. Compiled student scores were submitted to the OIT Assessment Commission on 12/7/2012 for compilation into the OIT-wide data set for further analysis.

**Table 12** SLO #3 Ethics ISLO Assessment Design

<i>Performance Criteria (5)</i>	<i>Assessment Method</i>	<i>Measurement Scale</i>	<i>Min. Acceptable Performance</i>
1. Demonstrates knowledge of the professional code of ethics 2. Using code of ethics, describes ethical issues 3. Describes parties involved and discusses their points of view 4. Describes and analyzes possible/alternative approaches 5. Chooses an approach and explains the benefits and risks	Student paper, rubric	1 = Limited or no proficiency 2 = Some proficiency 3 = Proficiency 4 = High proficiency	No score of 1

**Table 13** Data Summary: OIT Ethics Assessment

Score Stats	Performance Criteria				
	Knowledge of Code	Describes Issues	Describes Parties	Describes Alternatives	Benefits/risks of Choice
N = 26					
Mean	3.7	3.7	3.0	3.2	3.3
Range	2 - 4	3 - 4	2 - 4	0 - 4	0 - 4

- **STRENGTHS & WEAKNESSES IN STUDENT LEARNING** – The mean scores for each ethics performance criteria showed students to be proficient. However, 2 of 26 (7.7%) students received scores of 1 (limited – no proficiency): one student received a score of one for criterion 5 and one student received a score of one for criteria 4 and 5. It was clear to the faculty who evaluated the students’ work that the students’ did not ‘finish’ the assignment because the faculty reported a score of ‘0’ not 1 in these cases. Consequently, it is not possible to equate the scores in this case to a failure to meet the minimum acceptable performance for this assessment. Faculty had no problem conducting the assessment.
- **RECOMMENDATIONS FOR IMPROVEMENTS:** faculty made no recommendations for changes to the program curriculum associated with this ISLO. Also, because so few program students were OIT students before program admission, faculty made no recommendations for changes to OIT general education requirements. Detailed records on assessment activities are kept in the Office of the CLS Department Chair.

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Summary of 2012 – 2013 Assessment Activities - continued

**Student Learning Outcome #5:** Application of safety and governmental regulations and standards as applied to medical laboratory practice.

- SLO #5 required curricula listed in the curriculum map(table D) on page 22.
- MEASURE OF SLO – Direct Assessment: *Performance Appraisal* – At the end of fall term 2012, each program faculty assessed SLO #5 using externship students’ performance appraisal scores for Laboratory Performance: Safety (LPS) and Quality Assurance (LQA) as determined by clinical site faculty using the CLS 470 Externship professional development evaluation tool. LPS is defined as “follows laboratory and institutional safety policies.” LQA is defined as “performs appropriate quality control/quality assurance procedures.” Students are evaluated by clinical site faculty after completing clinical rotation sections including: a) chemistry/Immunology, b) hematology/UA, c) transfusion medicine, and, d) microbiology/serology. To ensure consistent scoring and to minimize interpretation bias, the program faculty education coordinator instructed clinical sites’ faculty on the use of the tool.
- SLO #5 ASSESSMENT DESIGN & DATA: assessment design and performance appraisal LPS and LQA scores are shown in tables 14 and 15.

**Table 14** SLO #5 Assessment Design

Performance Criterion	Assessment Method	Measurement Scale	Min. Acceptable Performance
LPS - follows laboratory and institutional safety policies	CLS 470 Externship Performance Appraisal	3 = Exceeds expectations 2 = Meets expectations 1 = Min. expectations not met N/A = Not observed	No score of 1
LQA - performs appropriate quality control/quality assurance procedures			

**Table 15** Externship Students’ Performance Appraisal Scores: LPS and LQA

Student	<b>Students’ Professional Evaluation LPS/LQA Scores by Rotation Section</b>							
	Chemistry/Immunology (N = 26)		Hem/UA (N = 26)		Transfusion Med		Micro/Serology	
	LPS	LQA	LPS	LQA	LPS (N = 25)	LQA (N = 25)	LPS (N = 26)	LQA (N = 25)
<b>Ave</b>	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1

- **STRENGTHS & WEAKNESSES IN STUDENT LEARNING**  
No student received a score of 1 for either performance criteria, LPS or LQA, after completing rotations. Consequently, the minimum acceptable performance for this assessment was met.
- **RECOMMENDATIONS FOR IMPROVEMENTS:** faculty made no recommendations for changes to the curriculum associated with this SLO. Detailed records on assessment activities are kept in the Office of the CLS Department Chair and may be found in individual student records maintained in the CLS program office.

## V. Evidence of Student Learning

**SLO # 1** - *Competency to perform a full range of testing in the contemporary medical laboratory encompassing pre-analytical, analytical, and post-analytical components of laboratory services*

- a. **Strengths** in student learning - students performed above expectations for all clinical practice areas: a) chemistry/Immunology, b) hematology/urinalysis, c) transfusion medicine, and, d) microbiology/serology. Data showed that mean scores on externship rotation final exams were above the  $\geq 75\%$  minimum acceptable performance. Only 1 of 26 (3.8%) of the first time examinees failed a final exam in 1 of 4 rotation sections (transfusion medicine), but the student passed the exam on second attempt. This was a welcomed improvement compared to the previous years (2011, 2010, etc.) in which multiple first time examinees failed a final exam in 1 or more rotation sections. Additionally, 26 of 26 (100%) first time examinees passed the national certification exam with scores well above the minimum pass score of 400 (program scaled mean score was 580).  
**Weaknesses** in student learning - none noted at this time for this SLO
- b. **Program improvements** - none at this time

**SLO #2** - *Proficiency to problem-solve, troubleshoot, and interpret results, and to use statistical approaches when evaluating data*

- a. **Strengths** in student learning - all students performed at or above expectations for this SLO, notably the same reported finding for the previous year (2011).  
**Weaknesses** in student learning - none noted at this time for this SLO
- b. **Program improvements** - none at this time

**SLO #3** - *Professional conduct and ethical behavior, respecting the feelings and needs of others, protecting the confidence of patient information, never allowing personal concerns and biases to interfere with the welfare of patients.*

- a. **Strengths** in student learning - all externship students, in all clinical laboratory sections, met or exceeded the benchmarks for the professional attributes of conduct and integrity reflected by the students' scores reported by clinical faculty using the CLS 470 externship professional development evaluation tool. Notably, this finding represents no change from the previously reported outcome for this SLO in the *2010-2011 CLS Program Annual Assessment Report*.  
**Weaknesses** in student learning - students were assessed using two ISLO: one for professionalism and one for ethics. In each case, the failures of a few students (no more than 2 of 26) to meet benchmarks for the performance criteria was not interpreted as weaknesses in student learning requiring curriculum changes but as outlier issues unrelated to student learning and scholarship.
- b. **Program improvements** - none at this time

**SLO #5** - *Application of safety and governmental regulations and standards as applied to medical laboratory practice.*

- a. **Strengths** - all externship students, in all clinical laboratory sections, met or exceeded the benchmarks for Laboratory Performance: Safety and Quality Assurance as reflected by the students' scores reported by clinical faculty using the CLS 470 externship professional development evaluation tool. Notably, this finding represents no change from the previously reported outcome for this SLO in the *2011-2012 CLS Program Annual Assessment Report*.  
**Weaknesses** in student learning - none noted at this time for this SLO
- b. **Program improvements** - none at this time

## VI. Changes Resulting from Assessment

- a. *Changes:* The 2010 – 2011 CLS Program Annual Assessment Report stated that “ASCP BOC exam scores decreased significantly for the 2010 CLS class” (see table 16, page 15). Consequently, as part of a 3-year study (2011 – 2013) “to better ascertain and improve laboratory skills and knowledge necessary for CLS students to successfully pass the ASCP BOC exam”, the CLS program faculty decided to implement the use of a mock board exam administered on-line through Media Lab, Inc. The exam was first administered in the summer term prior to students beginning their externships in 2011. The exam was also administered to the 2012 program students. Additionally, faculty proposed that a comprehensive CLS review book (Harr, Robert. *Medical Laboratory Science Review*, ISBN-13: 978-0967043425) become part of the student’s curriculum resources beginning with summer term 2012 and that students be asked about the book’s “educational attributes” following the taking of the ASCP BOC exam.
- b. *Re-assessment:* The mock exam previously described was used for both the class of 2011 and the class of 2012. Feedback from the class of 2011 was positive and their ASCP BOC scores reported as “significantly improved”. The CLS program graduates of 2012 also provided positive feedback (CLS program exit interview/survey conducted on-line between January 2013 and March 2013) regarding the mock exam. Their ASCP BOC exam scores also showed significant improvement compared to scores for the class of 2010 (see table 16, page 15). Review book feedback from both the class of 2011 and 2012 was also positive.
- c. *Results from prior assessment compared to re-assessment:* see table 16, page 15.
- d. *Summary of Findings and Changes for permanent program changes or new actions:*
  1. Both the mock exam and review book are being used for the class of 2013. Students’ feedback will be queried after they take the ASCP BOC (est. time frame between December 2013 and March 2014).
  2. Comparison of annual ASCP BOC total and subtest scores has been a good assessment tool to identify SLO and associated improvements when curricular changes are made. However, to increase the value of using ASCP BOC exam scores as an assessment tool of SLO, the program assessment coordinator recommended (spring term 2013 faculty meeting) that faculty also compare subtest breakout content scores. Breakout scores are a benchmark for identifying ***specific curriculum strengths and weaknesses*** that impact SLO (see table 17, page 16).
  3. Historically, the CLS program’s annual assessment report included/ reported indirect measures of SLO as part of the introduction, but not as assessments of SLO. The new NAACLS core and MLS (also known as CLS) unique standards for accredited programs mandate that a review of the following outcome measures from at least the last three active years must be documented, analyzed, and *used in program assessment and continuous quality improvement of the program*: 1) external certification or licensure results; 2) graduation rates; 3) attrition rates; 4) placement rates; 5) other (optional, but may include results of capstone projects, faculty feedback, graduate exit interviews, etc.). Beginning with the 2013-2014 year, the Oregon Tech • OHSU CLS Program Assessment plan will be re-designed to include both indirect and direct measures of SLO.

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**Table 16 ASCP BOC Total and Subtest Mean Scaled Scores for First Time Examinees 2009 - 2012**

	<b>Total Score</b>	<b>BBNK</b>	<b>CHEM</b>	<b>HEMA</b>	<b>IMMU</b>	<b>LO</b>	<b>MICR</b>	<b>UA</b>
2009 OIT•OHSU CLS Program's Mean Scaled Scores (N=24)	560	602	530	575	546	584	533	572
University Program's Mean Scaled Scores (N=2424)	472	494	483	494	483	508	485	481
	<b>Total Score</b>	<b>BBNK</b>	<b>CHEM</b>	<b>HEMA</b>	<b>IMMU</b>	<b>LO</b>	<b>MICR</b>	<b>UA</b>
2010 OIT•OHSU CLS Program's Mean Scaled Scores (N=22)	536	582	481	574	583	542	505	526
University Program's Mean Scaled Scores (N=2276)	492	495	492	496	488	518	487	485
	<b>Total Score</b>	<b>BBNK</b>	<b>CHEM</b>	<b>HEMA</b>	<b>IMMU</b>	<b>LO</b>	<b>MICR</b>	<b>UA</b>
2011 OIT•OHSU CLS Program's Mean Scaled Scores (N=35)	581	599	561	599	560	598	560	617
University Program's Mean Scaled Scores (N=2251)	502	500	501	512	494	519	499	495
	<b>Total Score</b>	<b>BBNK</b>	<b>CHEM</b>	<b>HEMA</b>	<b>IMMU</b>	<b>LO</b>	<b>MICR</b>	<b>UA</b>
2012 OIT•OHSU CLS Program's Mean Scaled Scores (N=26)	580	591	558	615	561	656	542	576
University Program's Mean Scaled Scores (N=2539)	501	502	498	510	490	526	500	491



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**Table 17** ASCP BOC sub-content breakout scores 2010 – 2012

	2010			2011			2012		
<b>BLOOD BANK</b>	#P	U	N	P	U	N	P	U	N
ABO and Rh	682	529	522	692	514	511	702	520	513
AB SCREEN & ID	561	515	512	572	509	508	530	528	524
Crossmatch and special tests	567	527	528	663	545	543	678	544	546
Donation & Trans. Therapy	730	504	503	564	504	506	717	503	503
	2010			2011			2012		
<b>CHEMISTRY</b>	P	U	N	P	U	N	P	U	N
Carbs/Acid/Base/Electrolytes	511	499	502	570	505	507	529	503	503
Proteins/Other Nitro. Comps.	433	500	502	521	508	509	549	506	505
Enzymes/Lipids/Lipoproteins	474	543	539	540	555	559	611	540	539
Special chemistry	448	499	502	546	501	505	542	500	506
	2010			2011			2012		
<b>HEMATOLOGY</b>	P	U	N	P	U	N	P	U	N
Erythrocytes and leukocytes	603	508	508	621	520	514	632	522	517
Other tests	523	505	504	625	518	519	649	511	510
Morphology and differential	601	509	514	540	531	529	624	534	529
Platelets and hemostasis	539	512	517	607	535	535	721	525	524
	2010			2011			2012		
<b>MICROBIOLOGY</b>	P	U	N	P	U	N	P	U	N
General Bacti & aerobic GPC	478	510	507	605	522	523	566	529	522
Aerobic gram-negative bacilli	547	519	514	528	524	521	577	524	525
GNC, GPB & anaerobes	466	462	459	483	481	478	358	482	476
F, V, Myco & parasites	480	492	496	576	508	506	587	508	506
	2010			2011			2012		
<b>IMMUNOLOGY</b>	P	U	N	P	U	N	P	U	N
Immunity	628	500	500	595	513	512	630	513	512
Infectious diseases	568	507	514	543	510	515	551	499	503
	2010			2011			2012		
<b>UA &amp; OTHER BFs</b>	P	U	N	P	U	N	P	U	N
Urinalysis	492	489	496	608	493	499	660	493	494
Other body fluids	754	538	552	682	554	574	606	550	557
	2010			2011			2012		
<b>LAB OPERATIONS</b>	P	U	N	P	U	N	P	U	N
	543	519	520	599	519	523	667	527	525

#P = OIT•OHSU CLS Program, U = All University-based Programs, N = All NAACLS - Accredited Programs

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**VII. References**

- a. Calvo, C. *Data Summary: Oregon Tech • OHSU ASCP BOC sub-content breakout scores 2010 – 2012*, (2012).
- b. Calvo, C. *2012 – 2013 Oregon Tech ISLO: Professionalism Data Report*. Submitted by C. Calvo on 3/20/2013 to the Oregon Tech Assessment Commission.
- c. Furman, A. *Oregon • OHSU Clinical Laboratory Science Program Annual Assessment Report 2011 – 2012*, (June 2012)
- d. Harr, Robert. *Medical Laboratory Science Review*. FA Davis: Philadelphia, Pennsylvania.
- e. Kamper, K. *2012 – 2013 Oregon Tech ISL: Ethics Data Report*. Submitted by C. Calvo on 12/7/2012 to the Oregon Tech Assessment Commission.
- f. National Accrediting Agency for Clinical Laboratory Sciences (NAACLS). *Guide to Accreditation*. Chicago, Illinois, 2011.

**VIII. Appendices**

a. Curriculum Map for SLOs

- Table A Curriculum Map for SLO 1
- Table B Curriculum Map for SLO 2
- Table C Curriculum Map for SLO 3
- Table D Curriculum Map for SLO 4

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**Appendix** CLS Program Curriculum Maps for Student Learning Outcomes

**SLO #1:** *Competency to perform a full range of testing in the contemporary medical laboratory encompassing pre-analytical, analytical, and post-analytical components of laboratory services*

**Table A** - Curriculum MAP for SLO 1; required courses are italicized

<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
FALL*	<i>CLS 406</i>	<i>Biometry</i>	2	
	<i>CLS 410</i>	<i>Clinical Microbiology I</i>	2	
	<i>CLS 420</i>	<i>Clinical Immunology</i>	3	
	<i>CLS 441</i>	<i>Practicum: Instrumentation</i>	1	
	<i>GROUP I</i>			
	<i>CLS 442</i>	<i>Practicum: Hematology</i>	6	
	<i>CLS 443</i>	<i>Practicum: Transfusion Medicine</i>	4	
	<i>Group II</i>			
	<i>CLS 444</i>	<i>Practicum: Microbiology</i>	6	
	<i>CLS 445</i>	<i>Practicum: Mycology</i>	2	
<i>CLS 446</i>	<i>Practicum: Parasitology</i>	2		
<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
WINTER	<i>CLS 411</i>	<i>Clinical Microbiology II</i>	2	
	<i>CLS 415</i>	<i>Clinical Chemistry I</i>	6	
	<i>CLS 447</i>	<i>Practicum: Chemistry</i>	6	
	<i>CLS 448</i>	<i>Immunology/Infectious Serology</i>	2	
	<i>CLS 449</i>	<i>Practicum: Urinalysis</i>	2	
<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
SPRING**	<i>CLS 416</i>	<i>Clinical Chemistry II</i>	2	
	<i>CLS 419</i>	<i>Immunochemistry</i>	2	
	<i>CLS 422</i>	<i>Theories of Molecular Methods</i>	2	
	<i>GROUP I</i>			
	<i>CLS 444</i>	<i>Practicum: Microbiology</i>	6	
	<i>CLS 445</i>	<i>Practicum: Mycology</i>	2	
	<i>CLS 446</i>	<i>Practicum: Parasitology</i>	2	
	<i>Group II</i>			
	<i>CLS 442</i>	<i>Practicum: Hematology</i>	6	
	<i>CLS 443</i>	<i>Practicum: Transfusion Medicine</i>	4	
<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
SUMMER	<i>CLS 412</i>	<i>Pathophysiology</i>	2	
	<i>CLS 423</i>	<i>Molecular Techniques</i>	1	
	<i>CLS 440</i>	<i>Practicum: Specimen Collection</i>	1	
	<i>CLS 452</i>	<i>Practicum: Adv Hem Tech</i>	2	
	<i>CLS 453</i>	<i>Practicum: Adv Trans Med Tech</i>	2	
	<i>CLS 454</i>	<i>Practicum: Adv Microbiology Tech</i>	2	
	<i>CLS 457</i>	<i>Practicum: Adv Immun/Chem Tech</i>	2	
	<i>CLS 459</i>	<i>Practicum: Adv UA Techniques</i>	1	
	<i>CLS 462</i>	<i>Clinical Laboratory Management</i>	2	
<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
FALL (2 <sup>nd</sup> year)	<i>CLS 470</i>	<i>Clinical Laboratory Externship</i>	16	

\*First year students are divided into 2 groups, I and II. Group I in the fall becomes Group II the following spring.

\*\*Group II in the fall becomes Group I in the spring.

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**Appendix** CLS Program Curriculum Maps for Student Learning Outcomes

**SLO #2:** Proficiency to problem-solve, troubleshoot, and interpret results, and to use statistical approaches when evaluating data

**Table B** - Curriculum MAP for SLO 2; required courses are *italicized*

<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
FALL*	CLS 406	<i>Biometry</i>	2	
	CLS 410	<i>Clinical Microbiology I</i>	2	
	CLS 420	<i>Clinical Immunology</i>	3	
	CLS 441	Instrumentation	1	
	<i>GROUP I</i>			
	CLS 442	<i>Practicum: Hematology</i>	6	
	CLS 443	<i>Practicum: Transfusion Medicine</i>	4	
	<i>Group II</i>			
	CLS 444	<i>Practicum: Microbiology</i>	6	
	CLS 445	<i>Practicum: Mycology</i>	2	
CLS 446	<i>Practicum: Parasitology</i>	2		
<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
WINTER	CLS 411	<i>Clinical Microbiology II</i>	2	
	CLS 415	<i>Clinical Chemistry I</i>	6	
	CLS 447	<i>Practicum: Chemistry</i>	6	
	CLS 448	<i>Immunology/Infectious Serology</i>	2	
	CLS 449	<i>Practicum: Urinalysis</i>	2	
<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
SPRING**	CLS 416	<i>Clinical Chemistry II</i>	2	
	CLS 419	<i>Immuno-hematology</i>	2	
	CLS 422	<i>Theories of Molecular Methods</i>	2	
	<i>GROUP I</i>			
	CLS 444	<i>Practicum: Microbiology</i>	6	
	CLS 445	<i>Practicum: Mycology</i>	2	
	CLS 446	<i>Practicum: Parasitology</i>	2	
	<i>Group II</i>			
	CLS 442	Practicum: Hematology	6	
	CLS 443	Practicum: Transfusion Medicine	4	
<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
SUMMER	CLS 412	Pathophysiology	2	
	CLS 423	<i>Molecular Techniques</i>	1	
	CLS 440	<i>Practicum: Specimen Collection</i>	1	
	CLS 452	<i>Practicum: Adv Hem Tech</i>	2	
	CLS 453	<i>Practicum: Adv Trans Med Tech</i>	2	
	CLS 454	<i>Practicum: Adv Microbiology Tech</i>	2	
	CLS 457	<i>Practicum: Adv Immun/Chem Tech</i>	2	
	CLS 459	<i>Practicum: Adv UA Techniques</i>	1	
CLS 462	Clinical Laboratory Management	2		
<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
FALL (2 <sup>nd</sup> year)	CLS 470	<i>Clinical Laboratory Externship</i>	16	

\*First year students are divided into 2 groups, I and II. Group I in the fall becomes Group II the following spring.

\*\*Group II in the fall becomes Group I in the spring.

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**Appendix** CLS Program Curriculum Maps for Student Learning Outcomes

**SLO #3:** *Professional conduct/ ethical behavior, respecting the feelings/needs of others, protecting the confidence of patient information, never allowing personal concerns/biases to interfere patient welfare*

**Table C** - Curriculum MAP for SLO 3; required courses are *italicized*

<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
FALL*	CLS 406	Biometry	2	
	CLS 410	Clinical Microbiology I	2	
	CLS 420	Clinical Immunology	3	
	CLS 441	Instrumentation	1	
	<i>GROUP I</i>			
	CLS 442	<i>Practicum: Hematology</i>	6	
	CLS 443	<i>Practicum: Transfusion Medicine</i>	4	
	<i>Group II</i>			
	CLS 444	<i>Practicum: Microbiology</i>	6	
	CLS 445	<i>Practicum: Mycology</i>	2	
CLS 446	<i>Practicum: Parasitology</i>	2		
<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
WINTER	CLS 411	Clinical Microbiology II	2	
	CLS 415	Clinical Chemistry I	6	
	CLS 447	<i>Practicum: Chemistry</i>	6	
	CLS 448	<i>Immunology/Infectious Serology</i>	2	
	CLS 449	<i>Practicum: Urinalysis</i>	2	
<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
SPRING**	CLS 416	Clinical Chemistry II	2	
	CLS 419	Immunochemistry	2	
	CLS 422	Theories of Molecular Methods	2	
	<i>GROUP I</i>			
	CLS 444	<i>Practicum: Microbiology</i>	6	
	CLS 445	<i>Practicum: Mycology</i>	2	
	CLS 446	<i>Practicum: Parasitology</i>	2	
	<i>Group II</i>			
	CLS 442	<i>Practicum: Hematology</i>	6	
	CLS 443	<i>Practicum: Transfusion Medicine</i>	4	
<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
SUMMER	CLS 412	Pathophysiology	2	
	CLS 423	<i>Molecular Techniques</i>	1	
	CLS 440	<i>Practicum: Specimen Collection</i>	1	
	CLS 452	<i>Practicum: Adv Hem Tech</i>	2	
	CLS 453	<i>Practicum: Adv Trans Med Tech</i>	2	
	CLS 454	<i>Practicum: Adv Microbiology Tech</i>	2	
	CLS 457	<i>Practicum: Adv Immun/Chem Tech</i>	2	
	CLS 459	<i>Practicum: Adv UA Techniques</i>	1	
CLS 462	<i>Clinical Laboratory Management</i>	2		
<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
FALL (2 <sup>nd</sup> year)	CLS 470	<i>Clinical Laboratory Externship</i>	16	

\*First year students are divided into 2 groups, I and II. Group I in the fall becomes Group II the following spring. \*\*Group II in the fall becomes Group I in the spring.

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**Appendix** CLS Program Curriculum Maps for Student Learning Outcomes

**SLO #5:** *Application of safety and governmental regulations and standards as applied to medical laboratory practice*

**Table D** - Curriculum MAP for SLO 5; required courses are *italicized*

<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
FALL*	CLS 406	Biometry	2	
	CLS 410	Clinical Microbiology I	2	
	CLS 420	Clinical Immunology	3	
	CLS 441	Instrumentation	1	
	<i>GROUP I</i>			
	CLS 442	<i>Practicum: Hematology</i>	6	
	CLS 443	<i>Practicum: Transfusion Medicine</i>	4	
	<i>Group II</i>			
	CLS 444	<i>Practicum: Microbiology</i>	6	
	CLS 445	<i>Practicum: Mycology</i>	2	
CLS 446	<i>Practicum: Parasitology</i>	2		
<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
WINTER	CLS 411	Clinical Microbiology II	2	
	CLS 415	Clinical Chemistry I	6	
	CLS 447	<i>Practicum: Chemistry</i>	6	
	CLS 448	<i>Immunology/Infectious Serology</i>	2	
	CLS 449	<i>Practicum: Urinalysis</i>	2	
<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
SPRING**	CLS 416	Clinical Chemistry II	2	
	CLS 419	Immunochemistry	2	
	CLS 422	Theories of Molecular Methods	2	
	<i>GROUP I</i>			
	CLS 444	<i>Practicum: Microbiology</i>	6	
	CLS 445	<i>Practicum: Mycology</i>	2	
	CLS 446	<i>Practicum: Parasitology</i>	2	
	<i>Group II</i>			
	CLS 442	<i>Practicum: Hematology</i>	6	
	CLS 443	<i>Practicum: Transfusion Medicine</i>	4	
<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
SUMMER	CLS 412	Pathophysiology	2	
	CLS 423	<i>Molecular Techniques</i>	1	
	CLS 440	<i>Practicum: Specimen Collection</i>	1	
	CLS 452	<i>Practicum: Adv Hem Tech</i>	2	
	CLS 453	<i>Practicum: Adv Trans Med Tech</i>	2	
	CLS 454	<i>Practicum: Adv Microbiology Tech</i>	2	
	CLS 457	<i>Practicum: Adv Immun/Chem Tech</i>	2	
	CLS 459	<i>Practicum: Adv UA Techniques</i>	1	
CLS 462	<i>Clinical Laboratory Management</i>	2		
<b>Term</b>	<b>Course Number</b>	<b>Course Title</b>	<b>Credits</b>	
FALL (2 <sup>nd</sup> year)	CLS 470	<i>Clinical Laboratory Externship</i>	16	

\*First year students are divided into 2 groups, I and II. Group I in the fall becomes Group II the following spring. \*\*Group II in the fall becomes Group I in the spring.