SAINT LOUIS UNIVERSITY.

Program-Level Assessment: Annual Report

Program: **Investigative & Medical Science (IMS)**	Department: **Clinical Health Sciences (CHS)**
Degree or Certificate Level: **BS**	College/School: **Doisy College of Health Sciences**
Date (Month/Year): **08/07/21**	Primary Assessment Contact: **Minh Kosfeld**

In what year was the data upon which this report is based collected? **2020-2021**

In what year was the program's assessment plan most recently reviewed/updated? **2019-2020**

1. Student Learning Outcomes

Which of the program's student learning outcomes were assessed in this annual assessment cycle?

PLO #1: Students will demonstrate the Jesuit value of "Women & Men for and with Others" to promote service in the medical sciences.

PLO #3: Students will critically evaluate data in the medical sciences.

PLO #4: Students will apply clinical knowledge to interpret medical science data to develop a differential diagnosis.

2. Assessment Methods: Artifacts of Student Learning

Which artifacts of student learning were used to determine if students achieved the outcome(s)? Please identify the course(s) in which these artifacts were collected. Clarify if any such courses were offered a) online, b) at the Madrid campus, or c) at any other off-campus location.

PLO #1: Students will demonstrate the Jesuit value of "Women & Men for and with Others" to promote service in the medical sciences.

Artifact 1A- Service Reflection Assignment/**BLS 1100 Foundations of Medical Laboratory Science**
Artifact 1B- Service Reflection Assignment/**BLS 4411 Fundamentals of Immunology**

The assessment of students' understanding of the Jesuit value "Women & Men for and with Others" and their progression was based on a Service Reflection assignment done in a freshman course BLS 1100 and repeated in a junior level course BLS 4411. In both courses, students were required to research the meaning of the Jesuit value, participate in community service, and then write a paper reflecting on this Jesuit value in their service activities. Most students in BLS 1100 were freshman who had limited knowledge of Jesuit values and service experience; thus their data are useful in providing a starting point from which we can judge progression. In contrast, most students in BLS 4411 were juniors who would have acquired extensive service experience as part of their preparation for post-graduate medical program application; thus, their data were used as an indicator of student's attainment of this PLO at a higher level.

PLO #3: Students will critically evaluate data in the medical sciences.

Artifact 3A- Hematology Laboratory Report/**BLS 1150 Foundations of Medical Laboratory Science Lab**
Artifact 3B- Hematology Case Study Analysis/**BLS 4210 Hematology**

The assessment of students' ability to critically evaluate medical science data was based on two hematology assignments. The first was a basic laboratory exercise in the freshman level course (BLS 1150) where students learned to count different types of blood cells and judged whether their results were accurate and appropriate for diagnosing a disease. The second was a more advanced case study in the

senior course (BLS 4210) where students must critically evaluate laboratory data to select the most applicable test results and evaluate their quality for the diagnosis of a blood disorder. Comparing data between the senior and freshman students provided us a means to judge the students' advancement for this PLO as they progressed through the program.

PLO #4: Students will apply clinical knowledge to interpret medical science data to develop a differential diagnosis.

Artifact 4A- Chemistry Laboratory Report/**BLS 1150 Foundations of Medical Laboratory Science Lab**
Artifact 4B- Chemistry Case Study Analysis/**BLS 4110 Medical Biochemistry I**

The assessment of students' ability to apply clinical knowledge to solve a medical case was based on two related chemistry case studies. The first was a basic laboratory exercise in the freshman level course (BLS 1150) where students learned to measure blood glucose levels and interpret the results to diagnose diabetes. The second was a more extensive case study in the junior course (BLS 4110) where students must apply their clinical knowledge to interpret a variety of laboratory data to diagnose diabetic ketoacidosis, assess treatment compliance, and monitor diabetic complications. Again, comparing students' outcomes between two separate courses is meant to assess whether students had achieved a higher level of the outcome.

Due to COVID-19, all courses listed above except BLS 1150 Foundations of Medical Laboratory Science Lab were "In-person Flex" mode in which both in-seat and online sessions were taught synchronously. The Chemistry Lab for Artifact 4A was conducted entirely online since students cannot share instruments per COVID distancing policy.

No Madrid artifacts were included, and no courses were at other off-campus locations.

3. Assessment Methods: Evaluation Process

What process was used to evaluate the artifacts of student learning, and by whom? Please identify the tools(s) (e.g., a rubric) used in the process and include them in/with this report.

For all artifacts for PLO's # 1, 3 and 4:

The instructors responsible for this PLO assigned the associated assignment to their students during the semester of each assessment cycle. The program director collected the artifacts from each course at the end of the semester and evaluated them according to the assignment description and PLO rubric (see Appendix). The benchmark for all PLOs is that an average of 85% of freshmen will demonstrate the "introduce" ranking on the corresponding PLO rubric, reflecting entry level knowledge or comprehension; and that an average of 85% of advanced students will demonstrate the "Reinforce" ranking on the corresponding PLO rubric, reflecting application of knowledge. The PLO rubric also includes the "Master" ranking for students who have gained the higher synthesis or evaluation skills.

PLO #1: Students will demonstrate the Jesuit value of "Women & Men for and with Others" to promote service in the medical sciences.

Artifact 1A- Service Reflection Assignment/**BLS 1100 Foundations of Medical Laboratory Science**
Artifact 1B- Service Reflection Assignment/**BLS 4411 Fundamentals of Immunology**

When evaluating Service Reflection papers, the program director looked for evidence of students' ability to understand, appreciate, and promote service. The program director assigned the ranking of "Introduce" to those students who were able to interpret the Jesuit value of "Women & Men for and with Others", "Reinforce" to those who discussed its impact in their service-learning activities, and "Master" to those who proposed how this Jesuit value could be integrated in healthcare services.

PLO #3: Students will critically evaluate data in the medical sciences.

Artifact 3A- Hematology Laboratory Report/**BLS 1150 Foundations of Medical Laboratory Science Lab**
Artifact 3B- Hematology Case Study Analysis/**BLS 4210 Hematology**

The program director evaluated each artifact for students' critical thinking skills by focusing on specific questions highlighted in the assignments (see Appendix). The program director identified students who could select the laboratory data pertinent to a disease condition as achieving the ranking of ""Introduce," those who could determine the quality of those data as achieving the ranking of "Reinforce" and those who could propose additional data needed to confirm a diagnosis as achieving the ranking of "Master."

PLO #4: Students will apply clinical knowledge to interpret medical science data to develop a differential diagnosis.

Artifact 4A- Chemistry Laboratory Report/**BLS 1150 Foundations of Medical Laboratory Science Lab**
Artifact 4B- Chemistry Case Study Analysis/**BLS 4110 Medical Biochemistry I**

The program director evaluated each artifact for student's skills in application of knowledge by focusing on specific questions highlighted in the assignments (see Appendix). The program director identified students who could recognize abnormal laboratory results as achieving the ranking of "Introduce," those who could intelligently discuss the clinical significance of the abnormal laboratory results as achieving the ranking of "Reinforce," and those who could propose a correct diagnosis based on the abnormal laboratory results as achieving the ranking of "Master".

See Appendix for the Assignments and PLO Rubric

4. Data/Results

What were the results of the assessment of the learning outcome(s)? Please be specific. Does achievement differ by teaching modality (e.g., online vs. face-to-face) or on-ground location (e.g., STL campus, Madrid campus, other off-campus site)?

NOTE:
The program target identified in the assessment plan, which is the minimum percentage of students able to achieve each PLO at the designated ranking, was established at the College standard rate of 85% or better by the former Dean of the Doisy College of Health Sciences.

PLO #1: Students will demonstrate the Jesuit value of "Women & Men for and with Others" to promote service in the medical sciences.

Artifact 1A- Service Reflection Assignment/**BLS 1100 Foundations of Medical Laboratory Science**

96% IMS freshmen (24/25) achieved the ranking of "Introduce".
96% IMS freshmen (24/25) achieved the ranking of "Reinforce".
76% IMS freshmen (19/25) achieved the ranking of "Master".

Artifact 1B- Service Reflection Assignment/**BLS 4411 Fundamentals of Immunology**

68% IMS juniors (15/22) achieved the ranking of "Introduce".
86% IMS juniors (19/22) achieved the ranking of "Reinforce".
95% IMS juniors (21/22) achieved the ranking of "Master".

Since 96% of freshmen were able to achieve the "Introduce" ranking and 86% of juniors achieved the "Reinforce" ranking, the program target for this PLO is met. The student that did not meet the "Introduce" ranking and the 14% of students that did not meet the "Reinforce" ranking failed to respond to the question

prompts in their reflection assignments.

The course delivery format (in-person Flex) had no obvious effect on the data/results for this PLO.

PLO #3: Students will critically evaluate data in the medical sciences.

Artifact 3A- Hematology Laboratory Report/**BLS 1150 Foundations of Medical Laboratory Science Lab**

96% IMS freshmen (24/25) achieved the ranking of "Introduce".
64% IMS freshmen (16/25) achieved the ranking of "Reinforce".
84% IMS freshmen (21/25) achieved the ranking of "Master".

Artifact 3B- Hematology Case Study Analysis/**BLS 4210 Hematology**

100% IMS seniors (21/21) achieved the ranking of "Introduce".
86% IMS seniors (18/21) achieved the ranking of "Reinforce".
90% IMS seniors (19/21) achieved the ranking of "Master".

Since 96% of freshmen were able to achieve the "Introduce" ranking and 86% of seniors achieved the "Reinforce" ranking, the program target for this PLO is met. The student that did not meet the "Introduce" ranking incorrectly identified increased lymphocytes as the marker for bacterial infection, and the 14% of students that did not meet the "Reinforce" ranking failed to identify the correct criteria for judging test reliability.

The course delivery format (in-person Flex) had no obvious effect on the data/results for this PLO.

PLO #4: Students will apply clinical knowledge to interpret medical science data to develop a differential diagnosis.

Artifact 4A- Chemistry Laboratory Report/**BLS 1150 Foundations of Medical Laboratory Science Lab**

83% IMS freshmen (19/23) achieved the ranking of "Introduce".
100% IMS freshmen (23/23) achieved the ranking of "Reinforce".
100% IMS freshmen (23/23) achieved the ranking of "Master".

Artifact 4B- Chemistry Case Study Analysis/**BLS 4110 Medical Biochemistry I**

88% IMS juniors (21/24) achieved the ranking of "Introduce".
96% IMS juniors (23/24) achieved the ranking of "Reinforce".
100% IMS juniors (24/24) achieved the ranking of "Master".

Since only 83% of freshmen were able to achieve the "Introduce" ranking, the program target for this PLO is not met at the entry level. However, 96% of juniors were able to achieve the "Reinforce" ranking, meaning that the program target is met at the higher level. The 4 students that did not meet the "Introduce" ranking either failed to provide an answer or used an inappropriate test range to evaluate glucose levels, and the student that did not meet the "Reinforce" ranking failed to relate abnormal clinical data to the pathophysiologic conditions.

While the course delivery format (in-person Flex) had no obvious effect on the data/results for Artifact 4B, the program director believed that moving the chemistry lab to an online modality may limit the overall learning experience and affect the achievement for Artifact 4A.

5. Findings: Interpretations & Conclusions

What have you learned from these results? What does the data tell you?

PLO #1: Students will demonstrate the Jesuit value of "Women & Men for and with Others" to promote service in the medical sciences.

Since all IMS students have aspirations to be a healthcare professional, one of the program outcomes is to instill in them a willingness to help those in need, which is a fundamental duty for all healthcare providers. Data from Artifact 1A and 1B indicate that the program has achieved this outcome by meeting the assigned benchmark. Furthermore, the data supports this outcome as one of our program's strength as 95% IMS juniors were able to reach the "Master" ranking by proposing an action that demonstrates the Jesuit value in healthcare service.

Although the benchmark was met for this PLO, fewer juniors achieved the "Introduce" and "Reinforce" levels than freshmen, suggesting lack of adequate advancement. This triggers the program director to dig deeper into the data for a cause. In all cases where the ranking level was not met, students addressed general Jesuit values in their critical reflection assignment but not the specific Jesuit value "Women & Men for and with Others," thus failing to meet the criteria specified in the PLO rubric. When reviewing the assignments, the program director discovered that Artifact 2B and its assignment rubric were not updated in accordance with the revised Assessment Plan to specify the Jesuit value "Women & Men for and with Others". This error may explain the lower rankings for this group of students and underestimate the program progression for this PLO.

PLO #3: Students will critically evaluate data in the medical sciences.

In preparation for a career in medical science, it is essential that IMS students be able to critically evaluate data for accuracy and applicability when diagnosing a given clinical condition. Data from Artifact 3A and 3B indicates that the program has achieved this outcome by meeting the assigned benchmark. The data also suggests that students are performing better than expected; with 90% of IMS seniors able to propose additional tests needed to confirm a diagnosis, achieving the "Master" level. When comparing data between the cohorts, the data trend provides evidence that the program has successfully advanced students' critical analytic skills. The evidence is expressed in 2 ways: more juniors than freshmen were able to meet each ranking level in the PLO rubric, and the achievement occurred even with a more complicated patient case.

Although the data support the program's progress in this PLO, it also identified specific areas for improvement. In searching for the reason why 14% of IMS seniors (3/21) failed to achieve the "Reinforce" ranking, the program director evaluated the assignment and discovered that there was no associated assignment rubric. While this deficiency does not explain the students' inability to select the appropriate criteria for judging test reliability, it did prompt an action item to improve the assessment process.

PLO #4: Students will apply clinical knowledge to interpret medical science data to develop a differential diagnosis.

One main goal of the IMS program is for students to be able to apply the medical knowledge learned throughout the program to develop a differential diagnosis. Data from Artifact 4A and 4B informed us that the juniors, but not freshmen, achieved this outcome by meeting the assigned benchmark. The program director is not surprised by the freshmen result since 1) the Artifact 4A had moved to the online format from a more hands-on in class approach. 2) This exercise is the first opportunity these entry-level students have to begin the correlation of didactic knowledge and clinical practice. Focusing on the data from the advanced group, this outcome reflects the program's strength as all IMS juniors were able to propose a correct diagnosis based on relevant abnormal laboratory results to achieve the "Master" level, even with a more complex patient case.

Searching for the reason why one IMS junior failed to achieve the "Reinforce" ranking, the program director reviewed the assignments and determined that some questions were multiple in nature and unclear. Different students can interpret the same questions differently, leading to correct but undesirable responses.

6. Closing the Loop: Dissemination and Use of Current Assessment Findings

A. When and how did your program faculty share and discuss these results and findings from this cycle of assessment?

The program faculty member associated with the action item shared and discussed the results and findings from this assessment cycle with the program director at the end of the course in dedicated assessment review meetings. During these meetings, the program director and faculty evaluated each artifact and associated data and investigated opportunities for improvement, where warranted. Ideally, the artifact should be aligned with the PLO it is intended to assess. When they do not fully align, then changes in the artifact and/or its implementation are formulated with input from the faculty member to ensure that it is appropriate and meaningful for both the associated course(s) and the overall program. Based on the outcomes of these discussions, the program director updated the Program Assessment Plan and Program Rubric accordingly, with notes for change recorded.

B. How specifically have you decided to use these findings to improve teaching and learning in your program? For example, perhaps you've initiated one or more of the following:

Changes to the Curriculum or Pedagogies	• Course content • Teaching techniques • Improvements in technology • Prerequisites	• Course sequence • New courses • Deletion of courses • Changes in frequency or scheduling of course offerings
Changes to the Assessment Plan	• Student learning outcomes • Artifacts of student learning • Evaluation process	• Evaluation tools (e.g., rubrics) • Data collection methods • Frequency of data collection

Please describe the actions you are taking as a result of these findings.

PLO #1: Students will demonstrate the Jesuit value of "Women & Men for and with Others" to promote service in the medical sciences.

We will continue to discuss the Jesuit value "Women & Men for and with Others", involve Student Services to provide structured service for students in Semester One, and rely on critical reflection of service learning in subsequent courses to determine program progression. We will also continue to collect data by cohort to assess trends. But we will revise Artifact 1B and its assignment rubrics to include the specific Jesuit value "Women & Men for and with Others" within the assignment prompt for the next assessment cycle. This action will ensure that the assignment and assessment rubric are aligned with the PLO and will guide students to be more specific in their responses to produce more relevant data for assessment.

PLO #3: Students will critically evaluate data in the medical sciences.

We will add more specific prompts to the Hematology Laboratory Report Assignment and create assignment rubrics for both artifacts to provide more transparent directions. This action will guide students to be more specific in their responses to produce more relevant data for assessing this PLO, and hopefully, will improve the outcome from "Introduce" to "Reinforce" for the next assessment cycle.

PLO #4: Students will apply clinical knowledge to interpret medical science data to develop a differential diagnosis.

We will break down questions with multiple components into separate in-depth questions in both assessment artifacts to provide more transparent directions. These changes will improve the gathering and analysis of relevant data.

If no changes are being made, please explain why.

NA

7. Closing the Loop: Review of Previous Assessment Findings and Changes

A. What is at least one change your program has implemented in recent years as a result of assessment data?

PLO #1: Students will demonstrate the Jesuit value of "Women & Men for and with Others" to promote service in the medical sciences.

In AY 18-19, it was determined that PLO #1 was too broad for students to understand the goal and expectation of the assignment. Therefore, it was narrowed to just one specific Jesuit value, "Women & Men for and with Others".

PLO #3: Students will critically evaluate data in the medical sciences.

In AY 18-19, it was determined that the evaluation process for artifact 3B overestimated student achievement because students were allowed to work in groups. Therefore, the assignment was revised to require students to work independently.

PLO #4: Students will apply clinical knowledge to interpret medical science data to develop a differential diagnosis.

In AY 18-19, it was determined that the data collection process for artifact 4A was inadequate because only oral subjective feedback was given by the course instructor for the group discussion of a case study. Therefore, artifact 4A was changed to a Clinical Chemistry Laboratory Report so assessment of students' ability is more objective and consistent. Artifact 4B was also modified. It is more complex to expand the data toward higher student achievement for this PLO.

B. How has this change/have these changes been assessed?

The impact of assessment-informed changes made in previous years is determined at the end of each assessment cycle. Student achievement data from the current cycle year AY20-21 were evaluated as described in section 3 above, applying the new PLO, artifacts, or assessment tools as outlined in the most current Assessment Plan. The program director then compared the new assessment results to those in the previous cycle years, where available.

C. What were the findings of the assessment?

PLO #1: Students will demonstrate the Jesuit value of "Women & Men for and with Others" to promote service in the medical sciences.

By focusing on one specific Jesuit value, "Women & Men for and with Others" instead of all, the outcome for AY 20-21 improved at the "Reinforce" level while the decline at the "Introduce" level is minimal, with both groups meeting the expected target (see table below). We are pleased with the results and will continue to assess the changes in future cycles.

Artifact	Ranking	AY18-19	AY20-21
1A	Introduce	100% (29/29)	96% (24/25)
1B	Reinforce	74% (20/27)	86% (19/22)

PLO #3: Students will critically evaluate data in the medical sciences.

By requiring students to work independently instead of in groups, the outcome for AY 20-21 declined at all levels but still met the expected target (see table below). We expected these lesser results since students had to work independently, but we believe that they are more realistic reflections of students' achievement. We are pleased with the results and will continue to assess the changes in future cycles.

Artifact	Ranking	AY18-19	AY20-21
3A	Introduce	100% (28/28)	96% (24/25)
3B	Reinforce	NA	86% (18/21)
3B	Reinforce	94% (/21)	90% (19/21)

PLO #4: Students will apply clinical knowledge to interpret medical science data to develop a differential diagnosis.

Since AY 20-21 was the first year that artifacts 4A and 4B were used to assess this PLO, there are no previous data to which to compare. Based on the positive outcomes in this assessment cycle where 96% IMS juniors (23/24) achieved the ranking of "Reinforce", we will continue using this tool and use these first-time assessment results as a benchmark.

D. How do you plan to (continue to) use this information moving forward?

At present, we do not have adequate and reliable data to make meaningful determinations about the program's effectiveness and to identify specific areas in curriculum for improvement. Moving forward, we will continue to acquire data for all PLOs to analyze trends, compared students' performance between courses and assessment cycles to do so. So far we are pleased with the assessment process and results from the changes made in 2018-2019. Evaluation of the AY 2020-2021 data indicates that the courses and artifacts align well with PLO# 1, 3, 4 and program curriculum, thus we will continue using them for the next assessment cycle. However, PLO #5 and its rubrics have been modified in response to the feedback from the 2019-2020 assessment report. The revised assessment plan and PLO rubric reflect these changes..

IMPORTANT: Please submit any assessment tools and/or revised/updated assessment plans along with this report.

Appendix

Current PLO Assessment Rubric

12/15/2017 original; revised 10/31/2019 based on data analysis for the 2018-2019 report; revised 09/21/2020 based on data analysis for the 2019-2020 report

Investigative and Medical Science (IMS)		
Clinical Health Sciences (CHS)		
Program Learning Outcome (PLO #1): Students will demonstrate Jesuit value of "Women & Men for and with Others" to promote service in the medical sciences.		
Introduce Knowledge/Comprehension	Reinforce Application/Analysis	Master Synthesis/Evaluation
• Interpret the Jesuit value "Men and Women for and with Others."	• Examine the impact of the Jesuit value "Men and Women for and with Others" in their volunteer, shadowing or work experiences.	• Propose an action in the performance of healthcare service activities that demonstrates the Jesuit value "Men and Women for and with Others"
Program Learning Outcome (PLO #2): Students will deliver a clear description of a medical sciences project.		
Introduce Knowledge/Comprehension	Reinforce Application/Analysis	Master Synthesis/Evaluation
• Identify the required elements when presenting a medical science project.	• Articulate a critical analysis of a medical science project.	• Defend the analysis of a medical science project proficiently when questioned
Program Learning Outcome (PLO #3): Students will critically evaluate data in the medical sciences.		
Introduce Knowledge/Comprehension	Reinforce Application/Analysis	Master Synthesis/Evaluation
• Identifies laboratory data that would be appropriate to diagnose a given condition	• Analyze laboratory data for accuracy and applicability to a given clinical condition	• Propose the gathering of additional laboratory data to further evaluate a given clinical condition.
Program Learning Outcome (PLO #4): Students will apply clinical knowledge to interpret medical sciences data to develop a differential diagnosis.		
Introduce Knowledge/Comprehension	Reinforce Application/Analysis	Master Synthesis/Evaluation
• Recognize abnormal clinical data.	• Determine clinical relevance of the abnormal clinical data.	• Accurately diagnose a disease.
Program Learning Outcome (PLO #5): Students will act with professional integrity.		
Introduce	Reinforce	Master
• Identifies professional behaviors that are desirable in a healthcare setting	• Demonstrates interpersonal skills that promote professional collegiality	• Propose a professional behavior toward peers when working together as a team

IMPORTANT NOTES: The ratings, identified by the column headings, are of increasing complexity moving across the table (from left to right). Students who can analyze/apply information presented in Medical Sciences (that is, meet the "reinforce" rating) must first have attained the Medical Science knowledge/comprehension rating (the "introduce" rating). Likewise, for students to propose diagnosis or solutions (the "master" rating), they must have knowledge/comprehension of the medical issue (the "introduce" rating) and apply/analyze pertinent information (the "reinforce" rating).

PLO #1-A: Service Reflection Assignment
BLS 1100 Foundations of MLS
Fall, 2020

This assignment has two parts:

1. Service-Learning Activity: participate in and document at least 5 hours of community service. Information on how to find suitable projects and the documentation form will be provided in class.

2. Service-Learning Paper: submit a reflection paper about the service experience
   —The paper format:
   - 1 page in length with one inch margins
   - Typed in font size 11 (Arial or Times Roman typeface preferred)
   - Double spaced

Grading: the following grading criteria will apply.

Grading Criteria: Points/Possible Points

1. Form documenting service hours _____/2 points
2. Reflection paper _____/8 points

Reflection Paper Grading Rubric

	Knowledge	Application	Synthesis
• Content 6 points total Knowledge: _____/1 Application: _____/3 Synthesis: _____/2	• Interpret the Jesuit value "Men and Women for and with Others."	• Describe how your volunteer experiences embodied this Jesuit value and its impact on you or others.	• Propose one action that would promote this Jesuit value in a medical setting.
• Organization and clarity: _____/1	• Connection from one concept to another lacking. Difficult to follow thought process.	• Minor difficulties in transitioning from one thought to another.	• Clear expression of ideas throughout paper.
Spelling and grammar: _____/1	• Poor sentence structure, consistent grammatical and spelling errors. Clearly not proofed or "spell-checked" appropriately.	• Inconsistent sentence structure, occasional grammatical and spelling errors. Needs improvement.	• Good sentence structure, no errors in grammar or spelling.

PLO #1-B: Service Reflection Assignment
BLS 4411 Fundamentals of Immunology
Fall 2020

This assignment involves writing a paper reflecting on your understanding of Jesuit values and their impact in the health professions, based on your volunteer and shadowing experiences.
—The paper format:
▪ 2 page in length with one inch margins
▪ Typed in 11 font (Ariel or Times Roman typeface preferred)
▪ Double spaced

This assignment involves writing a paper reflecting on your understanding of Jesuit values and their impact in the health professions, based on your volunteer and shadowing experiences.

The paper format:
▪ 2 page in length with one inch margins
▪ Typed in 11 font (Ariel or Times Roman typeface preferred)
▪ Double spaced

Grading: this assignment is worth 10 points and it is due on _**October 27th**. The following grading criteria will apply.

Grading Criteria:	Points/Possible Points
Content	/6 points
Organization and clarity	/2 points
Spelling and grammar	/2 points

Content (6.0 point)	**Organization and Clarity** (2.0 point)	**Spelling and Grammar** (2.0 point)
Identify Jesuit values and ways to promote them in the health professions. Discuss the impact of the application of Jesuit values by health professionals. And describe how you would integrate Jesuit values in your healthcare service activities. (3 points)	Clear expression of ideas throughout paper. (1.0 point)	Good sentence structure, no errors in grammar or spelling. (1.0 point)
Identify Jesuit values and ways to promote them in the health professions. And discuss the impact of the application of Jesuit values by health professionals. (2 points)	Minor difficulties in transitioning from one thought to another. (0.66 point)	Inconsistent sentence structure, occasional grammatical and spelling errors. Needs improvement. (0.66 point)
Identify Jesuit values and ways to promote them in the health professions. (1 point)	Difficult to follow thought process. Connection from one concept to another lacking. (0.33 point)	Poor sentence structure, consistent grammatical and spelling errors. Clearly not proofed or “spell-checked” appropriately. (0.33 point)

PLO #3-A Lab Module #5: Modified Hematology Procedure
BLS 1150 Foundations of MLS Laboratory
Fall 2020

HEMATOLOGY LABORATORY OBJECTIVES:

1. Discuss the three parts of the manual differential.
2. Observe a peripheral blood smear under the microscope.
3. Perform a modified white blood cell and platelet count, interpret the results, and render a presumptive diagnosis.

OVERVIEW OF EXAMINATION OF PERIPHERAL BLOOD SMEAR:

More information can be obtained from a detailed examination of a stained blood smear than from just about any other single laboratory test. A peripheral blood smear is made by spreading a drop of blood on a slide to produce one layer of cells with a "feathered" edge (see Figure below). The slide is stained with a Wright's stain to better visualize the cells and to aid in differentiating the types of white blood cells. The slide is read using a microscope on oil immersion. The 3 key components to observe are:

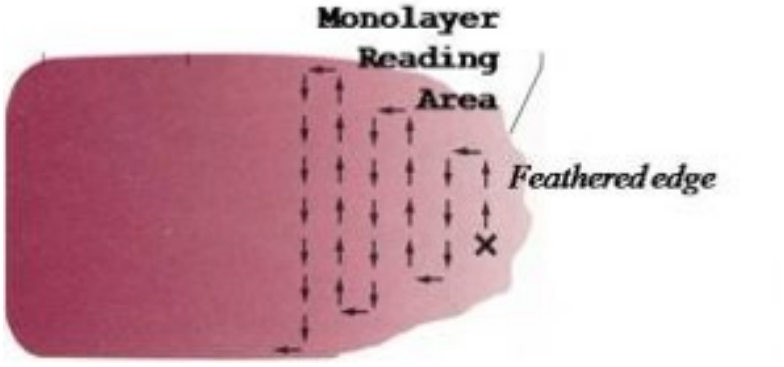
- White blood cells (WBCs) – differentiate type & population %
- Red blood cells (RBCs) – size, shape, and/or color
- Platelets – size, shape, granulation, and estimate of #

PERFORM A MODIFIED DIFFERENTIAL WHITE BLOOD CELL COUNT:

The 6 normal WBCs can be differentiated based on certain characteristics involving the size, nucleus, and cytoplasm of the cell, and then the percentage of each type of white blood cell can be determined. Differential testing can often suggest the patient's diagnosis.

NOTE: For this lab, the microscope has already been focused on oil immersion. **DO NOT change the objective**!!! The best location to view the cells is in the monolayer or thin area, where the RBCs are just touching. Reading outside this area will affect cell differential counts and morphology.

1. Move the slide to the monolayer or thin area indicated by the jagged arrow (see Figure below). Let an instructor help you locate the correct field before counting.
2. Identify each WBC seen in the microscopic field and record using the differential cell counter.
3. Once you have counted all the WBCs in one field, go to the next microscopic field, and continue counting the white blood cells. When counting WBCs, move the slide up, over, down, over, etc. as shown in the figure below.
4. Count a total of 25 white blood cells and record on the attached "Hematology Laboratory Worksheet". Then calculate % of each type of WBC.



PERFORM A PLATELET ESTIMATION:

Platelets are examined for changes in size, shape, and/or granulation, and to estimate the platelet count.

1. Examine the platelets in the monolayer or thin area of the slide.
2. Count the number of platelets in 1 field and record on the attached worksheet.
3. Then multiply this number by 20,000 to estimate the patient's platelet count.

WEEK 7: HEMATOLOGY LABORATORY WORKSHEET

Name: _____ Score: _____/15

Place the Slide Letter here: _____

Fill in the table below by performing a white blood cell differential on 25 WBCs and calculating the percentage of each cell type. (6 pts.)

WHITE BLOOD CELL TYPE	# OF CELLS COUNTED	% CALCULATED (# COUNTED X 4 = %)	NORMAL REFERENCE RANGE
1. SEGMENTED NEUTROPHIL			50-65%
2. BAND NEUTROPHIL			0-6%
3. LYMPHOCYTE			20-40%
4. MONOCYTE			4-10%
5. EOSINOPHIL			1-3%
6. BASOPHIL			0-1%
TOTAL	**25**	**25 x 4 = 100%**	

Perform platelet estimation in the thin area of slide where the RBCs barely touch. (0.5 points)

7. Platelets counted/field: # _____ X 20,000 = _____ /mm^3

8. Do your platelet counts match the counts written on the board? (2 points)

If not, list two ways to correct the discrepancy:

-
-

9. Based upon the above results (and the debriefing session), what might your patient be suffering from? (0.5 points)

_____

MATCHING: Match the white blood cell type on the left with the description that fits it best from the right. (5 pts.) (Obj., tax I)

_____ 10. Neutrophil — A. Smallest WBC and has no granules

_____ 11. Basophil — B. Largest WBC with a bi-lobed nucleus

_____ 12. Lymphocyte — C. WBC contains large purple or black granules

_____ 13. Monocyte — D. WBC contains large orange-red granules

_____ 14. Eosinophil — E. WBC contains multi-lobed nucleus & small pink granules

_____ 15. What type of stain is used to better visualize the cells and to aid in differentiating the types of white blood cells? (0.5 points)

A. Calcolfuor white stain
B. Gram stain
C. Kova stain
D. Wright's stain

_____ 16. Manual Differentials are performed using the ____ objective lens. (0.5 points)
A. 4X
B. 10X
C. 40x
D. 100X

_____ 17. Manual Differentials are performed using the ____ objective lens. (0.5 points)
A. 4X
B. 10X
C. 40x
D. 100X

Brain Teasers for the Hematology Lab

1. Which of the following WBC data from a manual peripheral blood smear evaluation would be consistent with a bacterial infection?

A. Increased segmented neutrophils
B. Increased lymphocytes
C. Increased eosinophils
D. Increased basophils

2. Based on the instructions for examining the peripheral blood smear, what one misstep could explain why the morphology of the WBCs you see on your slide is distorted and your differential counts differ from those written on the board?

- _____

3. If the WBC data from a manual peripheral blood smear evaluation are consistent with a bacterial infection, what additional laboratory information (does not need to be hematology) could aid in confirming the diagnosis?

- _____

PLO #3-B: RBC Disorders Case

BLS 4210 Hematology
Fall 2020

1. Clinical Presentation

A. The patient is a 46-year-old woman with a five-year history of heavy menses. Recently, the patient noted some fatigue and dyspnea on exertion.
B. List all the abnormalities stated in the clinical presentation.
C. Is this more likely an inherited, congenital, acquired, no disorder, or can't tell from the clinical presentation?
D. Discuss the evidence from the clinical presentation that led you to this suspicion.
E. Is this more likely an RBC, WBC, platelet disorder, none of the above, or can't tell from the clinical presentation?
F. Discuss any indicators from the clinical presentation that support your conclusion.

2. Laboratory Data

WBC:	6.2 x 10^9/L
RBC:	3.79 x 10^{12}/L
Hb:	8.3 g/dL
Hct:	27.8%
MCV:	73.3 fL
MCH:	21.9 pg
MCHC:	29.9 g/dL
PLT:	415 x 10^9/L

WBC Differential

Seg:	62%
Mono:	11%
Lymph:	23%
Eos:	3%
Baso:	1%

Micro = mod
Poiki = mod
Tget = few

A. Are the results acceptable, implying no instrument error?
B. Which three results can best predict that the results are acceptable? Why?
C. List ALL the abnormal results in order of priority.
D. Which cell line is most affected, WBC, RBC, or PLT?
E. Does an anemia exist? If so, slight, moderate or marked?
F. Which three results are the best at determining anemia? Why?
G. If present, classify the anemia using the MCV and MCHC results.
H. List three diseases that fit the classification selected above.
I. List three additional confirmatory lab tests that would assist in making the diagnosis.
J. Predict the results of these three tests for each of the three disorders chosen above (use low, high, normal or variable). (If variable, be specific)
K. List other lab tests that would be beneficial in making the diagnosis.
L. Predict the results of each test for each of the three diseases selected (use low, high normal or variable). (If variable, be specific)

3. Confirmatory Tests

Hb Electrophoresis:

Hb A = 97%
Hb A_2 = 2.2%
Hb F = < 1%

Serum Iron Panel:

TEST	RESULT	REFERENCE RANGE
Serum Iron =	25 µg/dL	(30-160 µg/dL)
Serum TIBC =	500 µg/dL	(240-450 µg/dL)
Serum Ferritin =	9 ng/mL	(12-240 ng/mL)
Transferrin Saturation =	15%	(20-50%)
Tissue Iron Stores =	+/-	(2+ - 3+)

A. What is your final diagnosis?
B. How does the CBC support the diagnosis?

C. How does the differential support the diagnosis?
D. How do the confirmatory tests support the diagnosis?
E. How should the patient be treated?
F. What is the prognosis?

PLO #4-A: Clinical Chemistry Laboratory Exercise Glucose Measurement
BLS 1150 Foundations of MLS Laboratory
Fall 2020

Purpose:

Perform a glucose assay and interpret the results to help resolve a case.

Case:

Using the information that was provided with the case presented in lecture, a physician ordered a serum glucose level along with other laboratory tests to evaluate and select proper treatment for the child. As the laboratorian on duty at the time, you are responsible for accurately measuring the amount of glucose in this child's blood.

Background:

Glucose, a six-carbon sugar, is the major source of energy for many human cells. In humans, brain cell function depends solely on blood glucose. If the blood glucose level is too low (hypoglycemia), cell metabolism will slow down or stop (unless other sources of energy can be utilized) and cells will die, resulting in CNS-related symptoms, coma and death. A high level of glucose in the blood (hyperglycemia) may indicate diabetes mellitus. In Type 1 diabetes mellitus, even though glucose may be present in high amounts, it is not able to enter the cells for metabolism and energy production. Thus, the cells must use other sources for energy production (e.g. fats). These other sources produce significant acid byproducts, grouped as "ketone bodies". The resulting acid environment may also disrupt brain cell function. Thus, both hyperglycemia and hypoglycemia may lead to coma and/or death. The fasting glucose reference range is 60-100 mg/dL. Values below 40 mg/dL or greater than 400 mg/dL are critical values that could be related to coma and/or death.

Glucose can be measured by several different methods. One method utilizes the reduction of copper: The more glucose present, the darker the purple color.

$$\underset{\text{(Blue)}}{\text{Glucose} + Cu^{++}} \xrightarrow{\text{Alkaline}} \underset{\text{(Purple)}}{Cu^{+}}$$

The intensity of the purple color produced is measured as light absorbance (A) using a spectrophotometer. The A of each sample is subtracted from the A of the blank to account for the color of the reagent. The concentration of glucose present in the unknown sample (from the patient) is then calculated using an equation comparing the unknown's A to the A of a standard whose glucose concentration is known. The equation is expressed below:

$$\text{Conc}_{\text{unknown}} = \text{Conc}_{\text{standard}} \times \frac{A_{\text{unknown}}}{A_{\text{standard}}}$$

To ensure that the method works, two levels of controls with known concentrations of glucose are tested along with the patient sample.

Required solutions:

1. Glucose Reagent
2. Glucose Standard (100 mg/dL glucose)
3. Serum Controls for Glucose: Normal (N) and Abnormal (A)

Prelab:

Watch the pre-lab video on _____

Procedure:

1. Students will work in pairs, sharing the Standard and Patient samples.
2. Each student will test three tubes as shown in the table below:

	Student 1	Student 2
Tube S	Standard	Standard
Tube N or A	Control N	Control A
Tube P_ (X, or Y, or Z)	Patient _	Patient _

3. Label 3 test tubes as below:
    - **S** for Standard
    - **N** for normal control or **A** for abnormal control (depending on whether you are Student 1 or 2)
    - **Px** for patient X, or **Py** for patient Y, or **Pz** for patient Z

    When handling the tubes, hold them near the top as leaving fingerprints may interfere with the absorbance reading.

4. Pipet **2.0 mL** of **Glucose Reagent** into each tube.

5. Pipet **100 uL** of:
    - The **glucose standard** into the **S** tube
    - The **normal control** into the **N** tube or the **abnormal control** into the **A** tube (whichever you have)
    - The designated **patient serum** into the **P_** tube

6. Carefully **vortex** each tube to mix them. Let stand at room temperature for **5 minutes**.

7. Carefully **vortex** each tube again.

8. Set the spectrophotometer to **540 nm**.

9. Load the **Blank** (B) tube into the spectrophotometer and set its **Absorbance (A) to 0.000**.

    A blank tube (2 mL reagent + 100 uL H_2O) will be provided at the spectrophotometer.

10. Load the other tubes into the spectrophotometer and record their **Absorbance (A) values** on the worksheet. **NOTE:** The darker the color, the higher the absorbance value should be.

11. Calculate the concentrations of the controls and patient sample using the following Beer's law formula and record your results on the worksheet.

$$\text{Conc}_{\text{unknown}} = \text{Conc}_{\text{standard}} \times \frac{A_{\text{unknown}}}{A_{\text{standard}}}$$

Glucose Measurement Worksheet

Note: Use pen to complete the worksheet

Name: _____

Date: _____ **Score:** _____/10 x 100 = _____

Assay: Glucose	**Reagent Lot #:**	**Reagent Expiration Date:**

Data & Calculation (4 points)

SAMPLE		DATA Absorbance (540nm)	CALCULATIONS Show your work	CONCENTRATION mg/dL
#	NAME		$Conc_{unknown} = Conc_{standard} \times \frac{A_{unknown}}{A_{standard}}$	
B	Blank (reagent)	0.000	___	0
S	Standard		___	**100**
N	Control N (75-90 mg/dL)			
A	Control A (260-305 mg/dL)			
P_	Patient ____ X, Y, or Z			

Interpretation (6 points):

Due to COVID-19, we will not have in class lab session for Fall 2020. However, we will provide you a video of the experiment and data. And instead of analyzing data for just one patient to solve the case, you will do all three to help in the differential diagnosis.

1. Would these patient results be reportable? How do you decide?

2. Based on the provided glucose results, determine the clinical status for each patient X, Y, Z (normoglycemic, hypoglycemic or hyperglycemic)? How do you decide?

   Patient X:
   Patient Y:
   Patient Z:

3. Presuming the salicylate/aspirin level is not elevated; use the glucose result together with the patient's presentation to propose an explanation for each patient's loss of consciousness.

   Patient X:
   Patient Y:
   Patient Z:

PLO #4-B: Analysis of a Clinical Chemistry Case Study
BLS 4110 Medical Biochemistry
Fall 2020

Objective: Students will apply clinical knowledge to interpret medical science data to develop a differential diagnosis.

Assignment: This assignment is meant to be done individually, not as a team. Please follow the steps below to address the case:

STEP 1: Read the case study and questions carefully.
STEP 2: Analyze patient laboratory test results.
STEP 3: Determine clinical relevance of the abnormal clinical data.
STEP 4: Formulate the answers with justification based on lecture materials.
STEP 5: Make your answers succinct, complete, and organized.
STEP 6: Proofread and edit.
STEP 7: Post the responses in Blackboard Discussion Board by **Wednesday, December 2, 2020.**

Grading Criteria	Possible Points (100)
Answer each question correctly Knowledge Analysis Application	45
Justify each answer with reference to the PowerPoints Relevance Interconnection Integration	45
Quality of answers Succinctness Organization Clarity	10

- The forum will be closed on **Wednesday, December 2, 2020** so a late assignment must be emailed to the instructor directly. Late assignments will incur a 50% deduction in grade.
- **After Friday, December 4, 2020, late assignment will not be accepted and a zero will be given.**

Chemistry Case

Chief Complaint: 8-year-old girl with frequent urination, excessive thirst, and weight loss.

History: Jane Doe, an 8-year-old girl previously in good health, has felt increasingly thirsty over the past month. She gets up several times a night to urinate and finds herself gulping down glassfuls of water. At the dinner table, she seems to be eating twice as much as she used to, yet she has lost 5 pounds in the past month. In the past three days, she has become nauseated, vomiting on three occasions, prompting a visit to her pediatrician.

A. At the doctor's office, blood and urine samples are taken. The following lab results are noted:

ANALYTE:	RESULT	REFERENCE RANGE
Na+	130 mmol/L	136–145 mmol/L
K+	6.0 mmol/L	3.4–5.0 mmol/L
Cl-	105 mmol/L	98–107 mmol/L
HCO_3^-	5 mmol/L	22–29 mmol/L
Glucose	550 mg/dL	70–100 mg/dL
Blood Urea Nitrogen (BUN)	20 mg/dL	7–18 mg/dL
Creatinine	1.3 mg/dL	0.5–1.3 mg/dL
Osmolality	315 mOsmol/kg	275–295 mOsmol/kg
Arterial blood pH	7.11	7.35–7.45
Urine Glucose	4+	Negative
Urine Ketones	3+	Negative

1. Based on the laboratory results above, what condition does Jane suffer from? Briefly explain its pathophysiology, including the role of insulin and glucagon in your answer.
2. Explain Jane's polyuria and polydipsia.
3. Jane has a fruity odor to her breath. What is its origin?
4. Jane's doctor notes that Jane is breathing rapidly and taking deep breaths. What physiological purpose does this serve?
5. Explain why low serum [Na^+] is the expected finding in this condition.
6. Explain why elevated serum [K^+] is the expected finding in this condition.
7. Why is the bicarbonate decreased?
8. What is the anion gap (including potassium in the equation)?
9. What causes her increased anion gap? (RR: 10-20 mmol/L).
10. What is Jane's calculated osmolality?
11. What causes the elevated osmolar gap? (RR: 0-10 milliosmol/L).
12. Following rehydration and treatment with insulin, blood glucose, serum osmolality and pH return to normal. However, Jane then develops generalized muscle weakness. Which test would be most important to evaluate in seeking a cause?

B. Following her visit to the pediatrician, Jane undergoes a diabetic care training program, learning how to self-inject insulin subcutaneously and check her blood-glucose level at home with chemstrips. In addition, she learns the importance of carrying candy and glucagon with her at all times as well as eating the right amounts of food at the right times each day.

1. What danger confronts Jane if she misses her insulin injection?

2. What dangers confronts Jane if she over–injects her artificially insulin?

3. Why must Jane carry candy and an emergency glucagon injection kit with her at all times?

C. Jane returns to her pediatrician three months later for a re-check. Her fasting blood glucose level is 95 mg/dl.and her glycosylated hemoglobin level (Hb_{A1C}) is 9.5%.

1. What is glycosylated hemoglobin?

2. What does Jane's Hb A1C level indicate that a one-time direct measurement of blood glucose does not?

3. What other conditions should be ruled out before interpreting Jane's Hb A1C result?

D. The years progress and Jane has considerable difficulty controlling her diabetes. She has been told that she has "brittle" diabetes, a form of the disease marked by wide swings in blood-glucose levels despite the best efforts at control. Jane is advised by her physician that she is at risk for developing several complications of diabetes.

1. What are these possible long-term complications of her disease?

2. Jane is advised that she must take extra care of her feet, including frequent inspections and never walking barefoot. Why is this important?

3. Diabetes is a known cardiovascular disease-risk equivalent. Discuss the effects of hyperglycemia on the following lipid levels and relate each dyslipidemia to its complication.

    a. Triglyceride
    b. LDL-cholesterol, including sdLDL
    c. HDL-cholesterol

E. In her mid-forties, Jane began to show early signs of diabetic nephropathy, as evidenced by the development of hypertension and the results of UA's and blood chemistry tests. Nonetheless, she felt fairly well over the next 10 years. At age 55, however, she has become increasingly fatigued with mild physical exertion and has required more sleep than before. In addition, she has frequent complaints of nausea, and in the past two weeks has vomited on several occasions. She has developed swelling in her ankles and is short of breath. Her cognitive function has declined, and she has become less responsive over the past day or so. Laboratory tests reveal that her kidney disease is now progressing at an accelerated rate:

BUN (blood urea nitrogen) = 56 mg /dl (normal = 10 - 20 mg / dl)
Creatinine = 4.1mg / dl
GFR = 13 mL/min/1.73 m^2
Urinary output = 25 cc /hour (normal = 50-60 cc / hour)

Jane is advised by her physician that her kidneys are failing. She is advised of treatment options: hemodialysis vs. continuous ambulatory peritoneal dialysis (CAPD) vs. kidney transplant. In consultation with her physician, Jane chooses to undergo hemodialysis. A checkup two weeks after beginning dialysis reveals the BUN has decreased to 35 mg /dl.

Although hemodialysis is fairly effective, it is not a perfect replacement for a kidney. Despite a regular schedule of hemodialysis, Jane experiences calcium and phosphate imbalance.

1. Identify the urine test that is most commonly used to identify early signs of diabetic nephropathy and explain its rationale.

2. Why are her serum BUN and Creatinine elevated?

3. What calculated lab value best reflects Jane's declining urine function and is used to help stage her chronic kidney disease? How is it determined?

4. Describe the pathophysiology of the calcium and phosphate imbalance that occurs in chronic renal failure, including the role of vitamin D.

5. What is soft-tissue calcification and why should Jane be concerned about it?

6. How would the endocrine system respond to the changes in blood calcium levels?

7. What effect will the compensatory mechanism have on the skeletal system? What is "renal osteodystrophy"?