

Bossier Parish Community College
Master Syllabus

Course Prefix and Number: ALHT 209

Credit Hours: 3

Course Title: Laboratory Testing

Course Prerequisites: Permission of the department

Textbook: Garrels, M.; Laboratory and Diagnostic Testing for Ambulatory Care, 4th edition

Course Description:

Principles and techniques of a variety of laboratory procedures commonly performed in the clinical setting. The course presents urinalysis, hematology, chemistry, immunology and microbiological testing and specimen collection, preparation and transportation. Withdrawal from lab mandates withdrawal from lecture.

Learning Outcomes:

At the end of this course, the student will

- A. demonstrate professionalism, standard precautions, and appropriate safety measures in a clinical laboratory setting;
- B. utilize proper techniques in blood collection; and
- C. utilize critical thinking in the performance and interpretation of testing of blood and body fluids using Clinical Laboratory Improvement Act (CLIA) waived or moderately complex laboratory testing methods.

To achieve the learning outcomes, the student will

1. list the reasons why laboratory tests are ordered and describe how specimens can be analyzed. (C)
2. describe the organization and function of medical laboratories. (C)
3. compare the advantages and disadvantages of performing laboratory tests in a physician's office laboratory versus an outside reference laboratory. (C)
4. identify the educational credentials of various personnel who work in laboratories. (C)
5. describe the necessary attributes required of the laboratory professional. (C)
6. identify and use laboratory requisitions and reports with proper documentation and confidentiality. (C)
7. interpret common metric system values used in laboratory test reporting. (C)
8. identify and apply the CDC's latest Standard Precautions for infection control and its recommendations regarding proper hand hygiene. (A)
9. *recognize the implications for failure to comply with Center for Disease Control (CDC) regulations in healthcare settings. (A)
10. explain the latest OSHA regulations regarding the Bloodborne Pathogens Standard and the Hazard Communication Program. (A)

11. identify waste classified as biohazardous and select appropriate containers for disposal. (A)
12. *demonstrate proper disposal of biohazardous material in sharps and regulated waste containers. (A)
13. describe the proper actions to take after exposure to bloodborne pathogens. (A)
14. list and explain the safety rules that must be observed in the laboratory. (A)
15. complete a posttest on safety training successfully. (A)
16. locate Internet sources for updates on OSHA regulations and CDC recommendations regarding laboratory safety. (A)
17. *identify and note the location of safety equipment, safety signs, symbols, labels, apparel, and safety manuals in the classroom laboratory. (A)
18. *describe the process in compliance reporting of unsafe activities and incident reports. (A)
19. *complete a mock exposure incident report in the workbook appendix. (A)
20. perform a medical hand wash followed by gloving and proper removal of gloves. (A)
21. label the parts of a compound microscope and explain the functions of each. (C)
22. perform a microscopic exercise according to acceptable standards on the Learning Outcome Evaluation in the workbook, including focusing a slide under low, high dry, and oil immersion, and cleaning and maintaining a microscope. (C)
23. explain the purpose of CLIA 1988 and its benefit to the patient. (C)
24. cite the three levels of complexity listed in CLIA 1988 and describe the process of obtaining certification to perform CLIA waived laboratory tests and physician-provided microscopy. (C)
25. locate the latest CLIA waived tests on the Internet. (C)
26. *identify CLIA waived tests associated with common diseases. (C)
27. discuss the 10 areas of Good Laboratory Practices. (A)
28. list and describe the three analytical phases of laboratory testing requiring quality assurance and quality control. (C)
29. explain the difference between quality assurance and quality control. (C)
30. *identify quality assurance practices in healthcare. (C)
31. define accuracy, precision, and reliability when observing the results of standard controls. (C)
32. identify trends, shifts, random error, or out-of-control values on Levey Jennings charts, and patient panic values. (C)
33. discuss current risk management and HIPAA issues as they apply to the physician's office laboratory. (A)
34. understand the uses and benefits of electronic medical records and bar coding as they relate to medical laboratories. (C)
35. *differentiate between normal and abnormal test results.
36. *maintain lab results using flow sheets. (C)
37. *reassure a patient of the accuracy of the test results. (C)
38. demonstrate an understanding of the urinary system. (C)
39. describe urine information, renal threshold, the flow of urine, and the composition of urine. (C)
40. discuss the importance of urinalysis. (C)
41. define the medical terms related to the urinary system. (C)

42. explain the proper method of urine collection for voided urine, clean-catch midstream urine for bacterial studies, and timed urine specimens. (C)
43. properly handle and dispose of urine specimens according to the most current OSHA safety guidelines. (A)
44. educate the patient in the proper method of urine collection. (C)
45. describe the three parts of a urinalysis: physical, chemical, and microscopic. (C)
46. state the tests involved in physical urinalysis. (C)
47. recognize diseases that cause abnormal results in a physical urinalysis. (C)
48. perform a physical assessment of an unknown urine sample according to the stated task, conditions, and standards listed on the student lab worksheets. (C)
49. list the 10 tests that can be performed with Multistix urine chemistry test strips. (C)
50. correlate various pathologic conditions with abnormal results on chemistry strips. (C)
51. perform a chemistry Multistix test on an unknown sample according to the stated task, conditions, and standards listed on the student lab worksheets. (C)
52. describe the automated methods for performing chemical urinalysis, including albumin protein testing. (C)
53. apply the correct quality control for physical and chemical urinalysis testing. (C)
54. follow the most current OSHA safety guidelines when performing a physical and chemical urinalysis. (A)
55. describe the standardized urine microscopic method (such as Kova). (C)
56. recognize the various elements in normal and abnormal urine microscopic sediment. (C)
57. correlate abnormal microscopic results with certain pathologic conditions. (C)
58. perform a microscopic urinalysis according to the stated task, conditions, and standards listed on the student lab worksheets. (C)
59. follow the most current OSHA safety guidelines when performing a microscopic urinalysis. (A)
60. correlate the results of a physical, chemical, and microscopic urinalysis. (C)
61. identify the cardiovascular anatomic structures that relate to phlebotomy. (B)
62. explain the functions of the cardiovascular structures that relate to blood collection. (B)
63. correlate the positions of arteries and veins with the use of tourniquets. (B)
64. discuss the Needle Stick Safety and Prevention Act. (A)
65. list the ways an employer complies with the Needle Stick Safety and Prevention Act. (A)
66. describe the appropriate steps for patient preparation, emphasizing the importance of correctly identifying the patient. (B)
67. explain the proper procedure for capillary puncture, demonstrating an understanding of site selection, equipment, and complications of this procedure. (B)
68. perform a capillary puncture according to the stated task, conditions, and standards listed on the student lab worksheets. (B)
69. evaluate a patient's venipuncture site availability and determine the correct venipuncture method to perform. (B)
70. describe the proper vacuum tube, syringe, and butterfly venipuncture methods. (B)
71. explain the order of draw for multiple-draw and syringe venipuncture. (B)

72. perform a Vacutainer venipuncture, syringe venipuncture, and butterfly venipuncture according to the stated task, conditions, and standards listed on the student lab worksheets. (B)
73. explain the complications of venipuncture procedures and know what to do when they occur. (B)
74. relate the most current OSHA safety guidelines for capillary puncture and the various venipuncture methods. (A)
75. maintain a safe work environment by following the most current guidelines for disposing of used equipment, and cleaning and disinfecting the working area. (A)
76. discuss the importance of risk management as it pertains to blood collection procedures. (A)
77. identify complications that can occur with phlebotomy procedures and discuss the appropriate steps to take when they occur. (B)
78. define and match terms and abbreviations from the glossary. (B)
79. identify the proper specimen collection for hematology testing. (B)
80. identify the blood components found in bone marrow and peripheral blood and describe their functions. (C)
81. describe and identify the basic formation of cells in the bone marrow. (C)
82. perform a blood smear and stain according to the stated task, conditions, and standards listed on the student lab worksheets. (C)
83. identify typical blood cells from a stained blood smear. (C)
84. observe selected abnormal cells from visual aids. (C)
85. describe the basic principles of hemostasis (including the involvement of blood vessels, platelets, clotting factors, and anticoagulants). (C)
86. identify equipment and supplies used in waived hematology and protime tests. (C)
87. follow the most current OSHA safety guidelines when performing hematology and coagulation tests and apply the correct quality control. (A)
88. perform the FDA-approved hemoglobin, hematocrit, erythrocyte sedimentation rate, and prothrombin time waived tests according to the stated task, conditions, and standards listed on the student lab worksheets. (C)
89. describe the role of prothrombin in blood coagulation. (C)
90. explain the major use of the prothrombin time test. (C)
91. describe the seven tests involved in the complete blood count. (C)
92. identify the red blood cell indices and explain their significance in determining anemia. (C)
93. explain the significance of the white blood cell count differential. (C)
94. perform or discuss the moderately complex QBC method used in ambulatory settings according to the stated task, conditions, and standards listed on the student lab worksheets. (C)
95. compare the QBC method to the Coulter counter method of complete blood count testing. (C)
96. identify the plasma components in peripheral blood and describe their function and significance. (B)
97. describe the proper specimen collection for various chemistry tests. (B)
98. explain the basic principles of glucose and fat metabolism. (C)
99. follow the most current OSHA safety guidelines when performing chemistry tests. (A)

100. perform FDA-approved glucose, hemoglobin A1c, lipid panel, and fecal occult blood CLIA waived tests according to the stated task, conditions, and standards listed on the student lab worksheets. (C)
101. identify FDA-approved urine drug tests and saliva alcohol tests. (C)
102. describe the Beer-Lambert law and the principle behind how analytes are measured by photometry. (C)
103. explain the importance of performing instrument calibrations, optics checks, and quality control. (C)
104. match various chemistry panels with the tests performed and the reason each panel is ordered. (C)
105. identify and inform the physician when laboratory reports show chemistry values out of the expected range. (C)
106. match possible chemistry disorders when test results are out of their reference range. (C)
107. explain the immune process. (C)
108. differentiate between cell-mediated immunity and humoral immunity. (C)
109. list the four ways to acquire adaptive immunity. (C)
110. list and match the classes of immunoglobulins (antibodies) with their locations and/or functions. (C)
111. discuss the principles of in vivo and in vitro immunology tests. (C)
112. give examples of direct and indirect immunology tests based on the detection of antigens or antibodies. (C)
113. perform a CLIA waived pregnancy test, infectious mononucleosis test, and *Helicobacter pylori* test according to the stated task, conditions, and standards listed on the student lab worksheets. (C)
114. describe mononucleosis and explain how it is diagnosed. (C)
115. discuss HIV and CLIA waived testing for HIV. (C)
116. discuss advanced immunologic techniques such as agglutination, enzyme-linked immunosorbent assay, and chromatographic immunoassay. (C)
117. observe a slide test for ABO blood typing for the presence or absence of immunologic agglutination or hemolysis to determine blood type. (C)
118. observe a slide test for Rh blood typing and explain how Rh incompatibility can cause erythroblastosis fetalis. (C)
119. explain how titers are used by physicians in the diagnosis and prognosis of disease conditions. (C)
120. identify common immunology tests within three categories: bacterial infections, viral infections, and detection of other antigens such as hormones and cancer-related substances. (C)
121. discuss quality control issues related to handling microbiological specimens. (C)
122. classify microorganism into the categories of bacteria, fungi, viruses, and parasites, and describe the general characteristics of each category. (C)
123. perform a throat swab specimen collection according to the stated task, conditions, and standards listed on the student lab worksheets. (C)
124. describe the proper collection and transportation procedures for microbiological specimens. (C)
125. explain the importance of Gram's staining in microbiology. (C)

126. prepare and perform a Gram stain on a bacterial smear according to acceptable standards. (C)
127. recognize gram-positive and gram-negative bacteria and describe their morphological characteristics. (C)
128. describe the procedures for acid-fast stains, and perform collection of specimen for wet mounts, and KOH preparation. (C)
129. perform specimen collection for the cellulose tape procedure for the identifications of pinworms. (C)
130. describe the diseases caused by group A *Streptococci*. (C)
131. perform a rapid group A *Streptococcus* test and a rapid influenza A and B test according to the stated task, conditions, and standards listed on the student lab worksheets. (C)
132. list and describe the types of culture media and their uses. (C)
133. identify the large equipment, inoculating equipment, and incinerating equipment used in microbiology laboratories. (C)
134. perform culture plate streaking methods for colony isolation and colony counting. (C)
135. explain the function of sensitivity testing. (C)
136. list pathogenic bacteria, fungi, and parasites frequently seen in the physician's office laboratory. (C)
137. discuss some of the organisms that could be used in bioterrorism. (C)
138. list some of the emerging infectious diseases. (C)
139. discuss professionalism and laboratory testing. (A)
140. demonstrate competency in the performance of the following skills: (C)
 - application of a pediatric urine collector
 - collection of a specimen for a newborn screening test
 - provide instructions for a fecal occult blood test
 - use a laboratory directory
 - complete a laboratory request form
 - instruct the patient in advance preparation requirements for a specimen collection
 - collect a specimen
 - properly handle and store a specimen
 - review a laboratory report
 - instruct a patient in clean-catch midstream urine specimen collection
 - instruct a patient in 24-hour urine specimen collection
 - assess the color appearance of a urine specimen
 - measure the specific gravity of a urine specimen
 - *obtain a specimen and perform a CLIA waived urinalysis
 - prepare a urine specimen for microscopic analysis
 - perform a rapid urine culture test
 - *obtain a specimen and perform a CLIA waived immunology test such as a urine pregnancy test
 - perform a venipuncture using the vacuum tube method
 - perform a venipuncture using the butterfly method
 - perform a venipuncture using the syringe method

- separate serum from whole blood
- obtain a capillary blood specimen
- perform a hemoglobin determination
- *obtain a specimen and perform a CLIA waived hematology test such as a hematocrit determination
- prepare a blood smear
- *obtain a specimen and perform a CLIA waived chemistry test
- perform a fasting blood sugar using a glucose monitor
- perform a rapid mononucleosis test
- use a microscope
- collect a specimen for throat culture
- obtain a specimen using a collection and transport system
- *obtain a specimen and perform a microbiology test such as a rapid strep test
- prepare a wet mount slide
- prepare a microbiologic smear

141. *measure and record a venipuncture and capillary puncture. (C)

142. *analyze healthcare results as reported in graphs and tables. (C)

143. complete a research paper on a topic related to course content. (C)

Course Requirements: To earn a grade of “C” or higher the student must earn 70% of the total points for the course and meet all of the following course requirements.

- minimum 70% on all tests including the comprehensive final exam
- competency on venipuncture skills test (with two attempts maximum)
- competency on skin puncture skills test (with two attempts maximum)
- competency on identified laboratory testing techniques
- satisfactory completion of a course related research paper

Course Grading Scale

- A- 90% or more of total points on tests including the comprehensive final exam and minimum score of 70% on venipuncture and skin puncture skills tests within two attempts and demonstrated competency on identified testing techniques and a satisfactory course related research paper
- B- 80% or more of total points on tests including the comprehensive final exam and minimum score of 70% on venipuncture and skin puncture skills tests within two attempts and demonstrated competency on identified testing techniques and a satisfactory course related research paper
- C- 70% or more of total points on tests including the comprehensive final exam and minimum score of 70% on venipuncture and skin puncture skills tests within two attempts and demonstrated competency on identified testing techniques and a satisfactory course related research paper

D- 60% or more of total points on tests including the comprehensive final exam and minimum score of 70% on venipuncture and skin puncture skills tests within two attempts and demonstrated competency on identified testing techniques and a satisfactory course related research paper

F- less than 60% of total points on tests including the comprehensive final exam or less than 70% on venipuncture and skin puncture skills tests within two attempts or failure to demonstrate competency on identified testing techniques or failure to submit a satisfactory course related research paper

Attendance Policy: The college attendance policy is available at <http://www.bpcc.edu/catalog/current/academicpolicies.html>

Nondiscrimination Statement

Bossier Parish Community College does not discriminate on the basis of race, color, national origin, gender, age, religion, qualified disability, marital status, veteran's status, or sexual orientation in admission to its programs, services, or activities, in access to them, in treatment of individuals, or in any aspect of its operations. Bossier Parish Community College does not discriminate in its hiring or employment practices.

Title VI, Section 504, and ADA Coordinator

Sarah Culpepper, Manager

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Equity/Compliance Coordinator

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Reviewed by Pam Tully & Melissa Shepherd/ March 2019