Course Syllabus

HPRS 1209- Interpretation of Laboratory Results

Catalog Description: An introduction to interpretation of commonly ordered laboratory results.

Lecture hours = 1, **Lab hours** = 0

Prerequisites: None

Semester Credit Hours: 1
Lecture Hours per Week: 1
Lab Hours per Week: 0
Contact Hours per Semester: 48

State Approval Code: 51.0000

Instructional Goals and Purposes: The purpose of this course is to introduce the student to laboratory tests that are commonly ordered by physician. This includes the name of the test, its clinical significance, and the correlation of results with disease states.

Learning Outcomes:
1. Explain the significance of commonly ordered laboratory tests.
2. Identify normal ranges.
3. Interpret results

Specific Course Objectives (includes SCANS):
After studying all materials and resources presented in the course, the student will be able to:

1. **Chapter 1 (1a-i, ii. 1b-ii, iii, iv, v, vi. 1c-i, iv. 2a-i. 2c-i, ii, iii, iv.)**
   a. List the requirements of a laboratory requisition.
   b. Describe correct patient identification before specimen collection.
   c. Explain Standard Precautions.
   d. List and define the phases of testing.
   e. Define Point-of-care testing.
   f. Define the following terms: False-Negative, False-positive, Sensitivity, Specificity, critical value, reference range
2. **Chapter 2 (1a-i, ii. 1b-ii, iii, iv, v, vi. 1c-i, iv. 2a-i. 2c-i, ii, iii, iv.)**
   a. Define Arterial puncture and state its use.
   b. Describe capillary puncture and when it is used.
   c. Identify the CORRECT area for infant heel sticks.
   d. Describe the venipuncture procedure.
   e. Identify obstacles that may interfere with venipuncture.
   f. Explain stool collection.
   g. Define the four basic urine collection procedures.
   h. Explain the difference in the resulting specimens for Clean-Catch and Catheterization.
3. **Hematology (1a-i, ii. 1b-ii, iii, iv, v, vi. 1c-i, iv. 2a-i. 2c-i, ii, iii, iv.)**

a. List the primary component of red blood cells.
b. Discuss the relationship of hemoglobin and hematocrit to anemia.
c. Explain the terms thrombocytopenia and thrombocytosis.
d. List the CBC reference ranges (WBC, RBC, HGB, HCT) for adults, children, and neonates.
e. Discuss the terms leukocytopenia and leukocytosis and common conditions associated with each.
f. Define reticulocyte.
g. Discuss the difference between screening tests and diagnostic tests.
h. Discuss the clinical correlations of ESR.

4. **Coagulation(1a-i, ii. 1b-ii, iii, iv, v, vi. 1c-i, iv. 2a-i. 2c-i, ii, iii, iv.)**
   a. Describe the test used to measure the extrinsic coagulation system.
   b. Discuss the test used to monitor heparin therapy.
   c. Explain specimen requirements for coagulation testing.
   d. Explain when protamine sulfate is used.
   e. Explain the clinical use of FDP.
   f. Define and describe DIC.
   g. Discuss the test used to monitor warfarin/Coumadin therapy.
   h. Define INR.
   i. Define D-Dimer.
5. **Chemistry (General) (1a-i, ii. 1b-ii, iii, iv, v, vi. 1c-i, iv. 2a-i. 2c-i, ii, iii, iv.)**
   a. List the best enzyme test to detect acute hepatitis.
   b. Discuss the enzyme that is related with the liver, but is also high in adolescents due to growth.
   c. Describe the clinical associations of AST and GGT.
   d. List the specimen collection and transport requirements for ammonia.
   e. Discuss the two tests that are best for the diagnosis of pancreatitis.
   f. Explain the clinical value of B-NP.
   g. Identify the gold standard biomarker associated with MI.
   h. Recognize the approximate reference range for fasting blood sugar in a healthy adult.
   i. Discuss critical values associated with Calcium and Magnesium and possible complication of these values.
   j. Identify the disease state associated with increased levels of uric acid.
   k. Identify the two tests most commonly associated with renal function.
   l. Identify the two tests used to diagnose and monitor jaundice.
   m. Define the clinical use of Total Protein.
6. **Chemistry (Special) (1a-i, ii. 1b-ii, iii, iv, v, vi. 1c-i, iv. 2a-i. 2c-i, ii, iii, iv.)**
   a. Identify the screening test for neural tube defects in the fetus.
   b. Identify Tumors marker used for ovarian cancer, colorectal cancer, breast cancer, gastric cancer, trophoblastic/germ cell tumors, and prostate cancer.
   c. Name the common Drugs of Abuse.
   d. Identify the toxic range of mercury (in the urine).
   e. Explain the terms peak and trough and how they apply to medication levels.
   f. Describe the effect of a low B12 level on the blood.
   g. Explain the expected thyroid test results in hypothyroidism.
   h. Give the trade and generic names for TDMs.
7. **Urinalysis (1a-i, ii. 1b-ii, iii, iv, v, vi. 1c-i, iv. 2a-i. 2c-i, ii, iii, iv.)**
   a. Discuss factors that may cause abnormal urine colors.
   b. Define specific gravity and give the normal specific gravity range of urine and water.
   c. Discuss the findings of excessive urinary albumin.
   d. Explain possible causes of urinary ketones.
   e. Discuss the finding of urinary myoglobin and the issues it may cause.
   f. Interpret the meaning of a positive urinary nitrate test.
   g. Discuss normal and abnormal urinary crystals.
   h. Define renal threshold as it pertains to glucose.
8. **Blood Bank (1a-i, ii. 1b-ii, iii, iv, v, vi. 1c-i, iv. 2a-i. 2c-i, ii, iii, iv.)**
   a. Define and Explain IAT and DAT in blood bank.
   b. Explain ABO blood type and the antibodies associate with each ABO type.

c. Summarize the importance of proper patient identification in all steps of crossmatching and transfusion.
d. Define the terms “universal donor” and “universal receiver”.
e. Explain the purpose of the crossmatch.

9. **Serology (1a-i, ii. 1b-ii, iii, iv, v, vi. 1c-i, iv. 2a-i. 2c-i, ii, iii, iv.)**
   a. Explain the diagnostic significance of ANA.
   b. Give the disease caused by each of the following viruses: Epstein-Barr and Varicella Zoster.
   c. Identify the tests used for screening and diagnosis of Syphilis.
   d. Identify the test used to diagnose cystic fibrosis.
   e. Identify the differences between Hepatitis A, B, and C.
   f. Discuss the most common sexually transmitted bacterial diseases in the U.S.
   g. Identify the bacteria commonly associated with active gastritis and peptic ulcers.
   h. Discuss the detection of the HIV antigen in the blood after exposure.
10. **ABGs (1a-i, ii. 1b-ii, iii, iv, v, vi. 1c-i, iv. 2a-i. 2c-i, ii, iii, iv.)**
   a. Discuss the normal pH of human blood and what the pH is indicative of.
   b. Contrast acidosis and alkalosis as it pertains to blood pH.
   c. Explain how to perform and interpret the Allen test.
   d. Discuss special circumstances for arterial punctures on patients taking anticoagulants.
   e. Define the purpose of a “mixed venous” blood gas.
   f. Discuss what is measured by arterial bicarbonate.
   g. Define carboxyhemoglobin.
   h. Discuss the affinity of CO to the hemoglobin molecule and how CO poisoning is treated.
   i. Contrast arterial blood gasses and venous blood gases.
   j. Outline the specific procedurals guidelines for a femoral arterial puncture.
   k. Explain how barometric pressure factors into blood gas measurement.
11. **Microbiology (1a-i, ii. 1b-ii, iii, iv, v, vi. 1c-i, iv. 2a-i. 2c-i, ii, iii, iv.)**
   a. Explain how temperature spikes relate to intermittent or transient organisms.
   b. Discuss the critical nature of a positive blood culture.
   c. Identify the female specimen of choice for genital culture.
   d. Name the causative agent of whooping cough.
   e. Identify reservoirs of *Staphylococcus aureus.*
   f. Discuss the proper collection of sputum.
   g. Discuss proper collection of samples for stool culture.
   h. Name the organism the is detected by RADT in throat cultures.
   i. Discuss the *most common* pathogens in the urinary tract infections, wound infections, and throat infections.
   j. Define the word “occult” as in “occult blood test”.
   k. Explain the different routes in which parasites may infect humans.
   l. Recognize the organism identified by the *transparent tape method.*

Course Content:
A general description of lecture/discussion topics included in this course are listed in the Learning Objectives / Specific Course Objectives sections of this syllabus.

Students in all sections of this course will be required to do the following:

1. Section quizzes:
   a. Course Policy Quiz
   b. Chapter 1 Quiz
   c. Chapter 2 Quiz
   d. Hematology Quiz
   e. Coagulation Quiz
   f. General Chemistry Quiz
   g. Special Chemistry Quiz
   h. Urinalysis Quiz
   i. Blood Bank Quiz
   j. Serology Quiz

k. ABG Quiz
l. Microbiology Quiz

2. Major Exams (3)
3. Take-home Final Exam

Methods of Instruction/Course Format/Delivery:
This course is offered in online format through Canvas. Students are required to take a minimum of two proctored exams taken in a Panola College (or other approved) testing center.

Major Assignments / Assessments:
The following items will be assigned and assessed during the semester and used to calculate the student's final grade.

Assignments

1. Course Policy Quiz
2. Chapter 1 Quiz
3. Chapter 2 Quiz
4. Hematology Quiz
5. Coagulation Quiz
6. General Chemistry Quiz
7. Special Chemistry Quiz
8. Urinalysis Quiz
9. Blood Bank Quiz
10. Serology Quiz

Assessment(s):

1. Exam #1
2. Exam #2
3. Exam #3
4. Take-home Comprehensive Final Exam

Course Grade:
The grading scale for this course is as follows:

- Assignments – 40%
- Exams – 40%
- Final Exam – 20%

Texts, Materials, and Supplies:
- Malarkey, Louise M and McMorrow, Mary Ellen (2012). *Saunders Nursing Guide to Laboratory and Diagnostic Tests 2e*. St. Louis: Elsevier.

Required Readings:
- Course Textbook
- All information given in Canvas course.

Recommended Readings:
- Medical Dictionary
- www.labtestsonline.org

Other:
- For current texts and materials, use the following link to access bookstore listings: http://www.panolacollegestore.com
- For testing services, use the following link: http://www.panola.edu/elearning/testing.html

- If any student in this class has special classroom or testing needs because of a physical learning or emotional condition, please contact the ADA Student Coordinator in Support Services located in the Administration Building or go to http://www.panola.edu/student-success/disability-support-services/ for more information.
- Withdrawing from a course is the student's responsibility. Students who do not attend class and who do not withdraw will receive the grade earned for the course.
- Student Handbook, *The Pathfinder:* http://www.panola.edu/student-success/documents/pathfinder.pdf

SCANS CRITERIA

1) **Foundation skills are defined in three areas: basic skills, thinking skills, and personal qualities.**

   a) **Basic Skills**: A worker must read, write, perform arithmetic and mathematical operations, listen, and speak effectively. These skills include:
      i) Reading: locate, understand, and interpret written information in prose and in documents such as manuals, graphs, and schedules.
      ii) Writing: communicate thoughts, ideas, information, and messages in writing, and create documents such as letters, directions, manuals, reports, graphs, and flow charts.
      iii) Arithmetic and Mathematical Operations: perform basic computations and approach practical problems by choosing appropriately from a variety of mathematical techniques.
      iv) Listening: receive, attend to, interpret, and respond to verbal messages and other cues.
      v) Speaking: Organize ideas and communicate orally.

   b) **Thinking Skills**: A worker must think creatively, make decisions, solve problems, visualize, know how to learn, and reason effectively. These skills include:
      i) Creative Thinking: generate new ideas.
      ii) Decision Making: specify goals and constraints, generate alternatives, consider risks, and evaluate and choose the best alternative.
      iii) Problem Solving: recognize problems and devise and implement plan of action.
      iv) Visualize ("Seeing Things in the Mind's Eye"): organize and process symbols, pictures, graphs, objects, and other information.
      v) Knowing How to Learn: use efficient learning techniques to acquire and apply new knowledge and skills.
      vi) Reasoning: discover a rule or principle underlying the relationship between two or more objects and apply it when solving a problem.

   c) **Personal Qualities**: A worker must display responsibility, self-esteem, sociability, self-management, integrity, and honesty.
      i) Responsibility: exert a high level of effort and persevere toward goal attainment.
      ii) Self-Esteem: believe in one's own self-worth and maintain a positive view of oneself.
      iii) Sociability: demonstrate understanding, friendliness, adaptability, empathy, and politeness in group settings.
      iv) Self-Management: assess oneself accurately, set personal goals, monitor progress, and exhibit self-control.
      v) Integrity and Honesty: choose ethical courses of action.

2) **Workplace competencies are defined in five areas: resources, interpersonal skills, information, systems, and technology.**

   a) **Resources**: A worker must identify, organize, plan, and allocate resources effectively.
      i) Time: select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.
      ii) Money: Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.
      iii) Material and Facilities: Acquire, store, allocate, and use materials or space efficiently.
      Examples: construct a decision time line chart; use computer software to plan a project; prepare a budget; conduct a cost/benefits analysis; design an RFP process; write a job description; develop a staffing plan.

   b) **Interpersonal Skills**: A worker must work with others effectively.
      i) Participate as a Member of a Team: contribute to group effort.
      ii) Teach Others New Skills.
      iii) Serve Clients/Customers: work to satisfy customer's expectations.

iv) Exercise Leadership: communicate ideas to justify position, persuade and convince others, responsibly challenge existing procedures and policies.
v) Negotiate: work toward agreements involving exchange of resources, resolve divergent interests.
vi) Work with Diversity: work well with men and women from diverse backgrounds.

Examples: collaborate with a group member to solve a problem; work through a group conflict situation, train a colleague; deal with a dissatisfied customer in person; select and use appropriate leadership styles; use effective delegation techniques; conduct an individual or team negotiation; demonstrate an understanding of how people from different cultural backgrounds might behave in various situations.

c) **Information**: A worker must be able to acquire and use information.
   i) Acquire and Evaluate Information.
   ii) Organize and Maintain Information.
   iii) Interpret and Communicate Information.
   iv) Use Computers to Process Information.

   Examples: research and collect data from various sources; develop a form to collect data; develop an inventory record-keeping system; produce a report using graphics; make an oral presentation using various media; use on-line computer data bases to research a report; use a computer spreadsheet to develop a budget.

d) **Systems**: A worker must understand complex interrelationships.
   i) Understand Systems: know how social, organizational, and technological systems work and operate effectively with them.
   ii) Monitor and Correct Performance: distinguish trends, predict impacts on system operations, diagnose deviations in systems' performance and correct malfunctions.
   iii) Improve or Design Systems: suggest modifications to existing systems and develop new or alternative systems to improve performance.

   Examples: draw and interpret an organizational chart; develop a monitoring process; choose a situation needing improvement, break it down, examine it, propose an improvement, and implement it.

e) **Technology**: A worker must be able to work with a variety of technologies.
   i) Select Technology: choose procedures, tools or equipment including computers and related technologies.
   ii) Apply Technologies to Task: understand overall intent and proper procedures for setup and operation of equipment.
   iii) Maintain and Troubleshoot Equipment: Prevent, identify, or solve problems with equipment, including computers and other technologies.

   Examples: read equipment descriptions and technical specifications to select equipment to meet needs; set up and assemble appropriate equipment from instructions; read and follow directions for troubleshooting and repairing equipment.