



Course Syllabus

PLAB 1223 – Phlebotomy

Catalog Description: Skill development in the performance of a variety of blood collection methods using proper techniques and standard precautions. Includes vacuum collection devices, syringes, capillary skin puncture, butterfly needles and blood culture, and specimen collection on adults, children, and infants. Emphasis on infection prevention, patient identification, specimen labeling, quality assurance, specimen handling, processing, accessioning, professionalism, ethics, and medical terminology.

Prerequisites: **Enrollment in this course requires enrollment in the MLT or MA program OR department head approval and successful completion of the admissions process.**

Semester Credit Hours: 2

Lecture Hours per Week: 2

Lab Hours per Week: 1

Contact Hours per Semester: 48

State Approval Code: 51.1009

Instructional Goals and Purposes: The purpose of this course is to teach and develop the skill of blood collection.

Class section meeting time: This is an online lecture course with face to face labs that once per week during the semester.

Alternate Operations During Campus Closure: In the event of an emergency or announced campus closure due to a natural disaster or pandemic, it may be necessary for Panola College to move to altered operations. During this time, Panola College may opt to continue delivery of instruction through methods that include but are not limited to: online learning management system (CANVAS), online conferencing, email messaging, and/or an alternate schedule. It is the responsibility of the student to monitor Panola College's website (www.panola.edu) for instructions about continuing courses remotely, CANVAS for each class for course-specific communication, and Panola College email for important general information.

Learning Outcomes:

1. Demonstrate infection control and safety practices.
2. Describe quality assurance as it relates to specimen collection.
3. Explain the role of specimen collection in the overall patient care system
4. Identify collection equipment, various types of additives used, special precautions necessary, and substances that can interfere in clinical analysis of blood constituents.
5. Demonstrate venipuncture and capillary puncture techniques on adults, children, and infants.
6. Explain requisitioning, transport and processing.

Specific Course Objectives (includes SCANS):

After studying all materials and resources presented in the course, the student will be able to:

Chapter 3- (1a-v, 1b-ii, 2c-iii)

- 3.1 Describe the six components of the chain of infection and the safety precautions that will break the chain.
- 3.2 Define healthcare-associated infections.
- 3.3 Explain the correct procedure for performing routine hand hygiene.
- 3.4 Identify the personal protective equipment (PPE) used by phlebotomists.
- 3.5 Describe the procedures for donning and doffing PPE.
- 3.6 Define Standard Precautions (SPs).
- 3.7 Describe procedures for transmission prevention.
- 3.8 Explain the procedures followed by phlebotomists in transmission-based and protective/reverse isolation areas.
- 3.9 Name a common disinfectant for blood and body fluids.
- 3.10 Describe the requirements mandated by the Occupational Exposure to Bloodborne Pathogens (BBPs) compliance directive.
- 3.11 List the actions to take when an exposure to BBPs occurs.
- 3.12 Describe safety precautions used when handling chemicals and the purpose of a safety data sheet (SDS).
- 3.13 Describe the use of the Globally Harmonized System (GHS).
- 3.14 State when a phlebotomist should avoid areas marked with a radiation symbol.
- 3.15 Discuss electrical safety and the procedure to follow in cases of electrical shock.
- 3.16 Define the acronyms RACE and PASS.
- 3.17 Identify types of fire extinguishers and the National Fire Protection Association (NFPA) hazardous materials symbols.
- 3.18 List precautions observed by phlebotomists to avoid physical hazards..

Chapter 1 (1a-i, 1a-v, 1b-v, 2c-i, 2c-ii, 2c-iii)

- 1.1 State the traditional and expanding duties of the phlebotomist.
- 1.2 Describe the professional characteristics that are important for a phlebotomist to possess.
- 1.3 Discuss the importance of communication and interpersonal skills for the phlebotomist within the laboratory, with patients, and with personnel in other departments of the hospital.
- 1.4 Describe the three components of effective communication.
- 1.5 List the barriers to verbal communication and methods to overcome them.
- 1.6 Describe correct listening and body language skills expected of a phlebotomist.
- 1.7 State six rules of proper telephone etiquette.
- 1.8 Define cultural diversity and discuss the actions needed by a phlebotomist when encountering an individual from a different culture.
- 1.9 State the competencies expected of a certified phlebotomist.
- 1.10 Discuss the role of each of the following in the regulation of health care: the Clinical Laboratory Improvement Amendments (CLIA), the Clinical and Laboratory Standards Institute (CLSI), The Joint Commission (TJC), the College of American Pathologists (CAP), and the Commission on Laboratory Assessment (COLA).
- 1.11 Describe the functions of the nursing, support, fiscal, and professional hospital service areas and the functions of the departments contained in these service areas.
- 1.12 Describe the different health-care settings in which a phlebotomist may be employed.

Chapter 2 (1a-i, 1a-v, 1b-v, 2c-i, 2c-ii, 2c-iii)

- 2.1 Distinguish between the two main divisions of the laboratory and the subsections within each of these divisions.
- 2.2 Describe the qualifications and functions of the personnel employed in a clinical laboratory.
- 2.3 Discuss the basic functions of each of the following sections: hematology, chemistry, blood bank (BB; immunohematology), serology (immunology), microbiology, and urinalysis (UA).
- 2.4 Describe the appropriate collection and handling of specimens analyzed in the individual sections of the clinical laboratory.
- 2.5 Identify the tests performed most commonly in the individual sections of the clinical laboratory and state their functions.

Chapter 4 (1a-i, 1a-v, 1b-v, 2c-i, 2c-ii, 2c-iii)

- 4.1 Define and state the purpose of prefixes, word roots, suffixes, and combining forms.
- 4.2 Correctly form medical terms using prefixes, word roots, suffixes, and combining vowels.
- 4.3 State the meaning of the commonly used prefixes, suffixes, and word roots.
- 4.4 Associate common word roots with the corresponding body system.
- 4.5 State the different plural forms of medical terms, and demonstrate correct pronunciation of medical terms.
- 4.6 Define the meanings of common medical abbreviations.
- 4.7 Name the abbreviations on The Joint Commission's "Do Not Use" list.

Chapter 5 (1a-v, 1a-i, 1b-ii, 1c-ii, 2c-iii)

- 5.1 Explain the levels of organization of the human body.
- 5.2 Use directional terms to describe the position and location of body structures.
- 5.3 List the body cavities, and name the main organs contained in each cavity.
- 5.4 Use the correct medical terminology to list all the body systems, and identify their functions and major components.
- 5.5 List the major disorders associated with each body system.
- 5.6 Relate the major diagnostic laboratory tests to their associated systems.

Chapter 6 (1a-i, 1a-v, 1b-v, 2c-i, 2c-ii, 2c-iii)

- 6.1 Briefly describe the functions of the blood vessels, heart, and blood.
- 6.2 Differentiate between arteries, veins, and capillaries by structure and function.
- 6.3 Locate the femoral, radial, brachial, and ulnar arteries.
- 6.4 Locate the basilic, cephalic, median cubital, radial, superior vena cava, inferior vena cava, and saphenous veins.
- 6.5 Trace the pathway of blood through the heart, and define the function of each chamber.
- 6.6 Explain the purpose of the coronary circulation.
- 6.7 Describe the cardiac cycle, and explain the function of the sinoatrial (SA) node.
- 6.8 Identify the components of blood.
- 6.9 State the major function of red blood cells (RBCs), white blood cells (WBCs), and platelets.
- 6.10 Briefly explain the coagulation process.
- 6.11 Describe the major disorders associated with the circulatory system.
- 6.12 State the clinical correlations of laboratory tests associated with the circulatory system.

Chapter 7 (1a-v, 1b-ii, 2c-iii)

- 7.1 Discuss the use of a blood collection tray, mobile phlebotomy workstations, and drawing stations.
- 7.2 List the items that should be carried on a blood collection tray.
- 7.3 Differentiate among the various safety needle sizes as to gauge, length, and purpose.
- 7.4 Describe the correct methods to safely dispose of contaminated needles.
- 7.5 Differentiate among an evacuated tube system (ETS), a syringe system, and a winged blood collection set, and state the advantages and disadvantages of each for blood collection.
- 7.6 Identify the types of evacuated tubes by color code, and state the anticoagulants and additives present, any special characteristics, and the purpose of each.
- 7.7 State the mechanism of action, advantages, and disadvantages of the anticoagulants ethylenediaminetetraacetic acid (EDTA), sodium citrate, potassium oxalate, and heparin.
- 7.8 List the correct order of draw when collecting multiple tubes of blood.
- 7.9 Describe the purpose and types of tourniquets.
- 7.10 Name the substances used to cleanse the skin before venipuncture.
- 7.11 Discuss the use of gauze, bandages, gloves, and slides when performing venipuncture.
- 7.12 Describe the quality control of venipuncture equipment.
- 7.13 Correctly select and assemble venipuncture equipment when presented with a clinical situation.

Chapter 8 (1a-v, 1b-ii, 2c-iii)

- 8.1 List the required information on a test requisition form.
- 8.2 Discuss the appropriate procedure to follow when greeting and reassuring a patient.

- 8.3 Describe correct identification procedures for inpatients and outpatients.
- 8.4 Describe patient preparation and positioning.
- 8.5 Correctly assemble venipuncture equipment and supplies.
- 8.6 Identify the three veins used most frequently for venipuncture.
- 8.7 Correctly apply a tourniquet, and state why the tourniquet can be applied for only 1 minute.
- 8.8 Describe vein palpation.
- 8.9 Discuss the procedure for cleansing the venipuncture site.
- 8.10 State the steps in a venipuncture procedure, and correctly perform a routine venipuncture using an evacuated tube system (ETS).
- 8.11 Demonstrate safe disposal of contaminated needles and supplies.
- 8.12 List the information required on a specimen tube label.
- 8.13 Explain the importance of delivering specimens to the laboratory in a timely manner.

Chapter 9 (1a-v, 1b-ii-v, 1c-ii 2c-iii)

- 9.1 Explain the procedure for coordinating requisition forms, patient identification, and labeling of tubes for unidentified patients.
- 9.2 Discuss the procedures to follow when patients are asleep, not in their rooms, or being visited by a physician, member of the clergy, or friend.
- 9.3 Describe the identification procedure for patients who are too young, are cognitively impaired, or whose first language is not English.
- 9.4 Explain the preexamination variables that affect laboratory test results.
- 9.5 Identify patient complications, and describe methods to handle each situation.
- 9.6 Discuss the procedure to follow when a patient develops syncope during the venipuncture procedure.
- 9.7 State the facility policy regarding patients who refuse to have their blood drawn.
- 9.8 List the reasons why a tourniquet can be applied for only 1 minute.
- 9.9 Describe methods used to locate veins that are not prominent.
- 9.10 Describe conditions in which it is not advisable to draw from veins in the legs or feet.
- 9.11 Explain the reasons why blood should not be drawn from a hematoma, a burned or scarred area, or an arm adjacent to a mastectomy.
- 9.12 State the procedure to follow when drawing blood from a patient with an arteriovenous fistula.
- 9.13 Describe the venipuncture procedure using a syringe, including equipment preparation, technique for exchanging syringes, transfer of blood to evacuated tubes, and disposal of the equipment.
- 9.14 Describe the venipuncture procedure using a winged blood collection set, the technique involved, and disposal of the equipment.
- 9.15 Identify technical complications during venipuncture, and describe remedies for each situation.
- 9.16 State reasons why blood may not be obtained immediately from a venipuncture, and describe the procedures to follow to obtain blood.
- 9.17 List venipuncture errors that may produce hemolysis as well as the tests affected.
- 9.18 List causes of hematomas.
- 9.19 List reasons for rejecting a specimen.

Chapter 10 (1a i-v, 1b ii-iv 2c i-iii)

- 10.1 Explain the importance of various test collection priorities.
- 10.2 Define a fasting specimen, and name three tests affected by not fasting.
- 10.3 List four reasons for requesting timed specimens.
- 10.4 Explain the requirements for oral glucose tolerance tests (OGTTs).
- 10.5 Discuss diurnal variation of blood constituents, and list substances that are affected.
- 10.6 Differentiate between a trough level and a peak level in therapeutic drug monitoring, and state the importance of collecting the specimen at the prescribed time.
- 10.7 Discuss the timing sequences for the collection of blood cultures, the reasons for selecting a particular timing sequence, and the number of specimens collected.
- 10.8 Describe the aseptic techniques required when collecting blood culture specimens.

- 10.9 Discuss blood collection from venous access devices.
- 10.10 Describe the procedure for collecting specimens for cold agglutinins and cryoglobulins.
- 10.11 List tests that must be chilled immediately after collection and methods for transporting specimens to the laboratory.
- 10.12 List tests for which the results are affected by exposure of the specimen to light.
- 10.13 Define the chain of custody.
- 10.14 Describe the criteria for collection and processing of specimens requested for forensic studies.
- 10.15 List tests frequently requested for molecular diagnostic studies.
- 10.16 Describe physical and emotional conditions in pediatric and geriatric patient populations and the effects of these conditions on blood

Chapter 11 (1a-i, 1a-v, 1b-v, 2c-i, 2c-ii, 2c-iii)

- 11.1 State the complications associated with puncture of the deep veins in infants.
- 11.2 List the reasons for performing dermal punctures on infants, children, and adults, and explain why certain tests cannot be performed on capillary specimens.
- 11.3 Describe the composition of capillary blood, and name four test results that may differ when obtained with capillary versus venous blood.
- 11.4 Describe the types of equipment needed for collection of a dermal specimen.
- 11.5 Identify acceptable and unacceptable sites for performing heel and finger punctures and the times when each is performed.
- 11.6 Discuss the purpose and method for warming the puncture site.
- 11.7 State the complications resulting from the presence of alcohol at the puncture site.
- 11.8 State the correct positioning of the lancet for dermal puncture.
- 11.9 Name the major causes of contamination of capillary specimens.
- 11.10 State the order of collection for capillary specimens.
- 11.11 Describe the correct labeling of capillary specimens.
- 11.12 Correctly perform dermal punctures on the heel and the finger.
- 11.13 Discuss the necessary precautions for collecting high-quality specimens for newborn bilirubin tests.
- 11.14 Discuss why and how newborn filter paper screening tests are collected.
- 11.15 Describe the collection of capillary blood gases (CBGs), including sources of technical error.
- 11.16 Explain the reason for thick and thin blood smears and describe how they are made

Chapter 12 (1a-v, 1bii-v, 1c-ii 2c-iii)

- 12.1 State the recommended requirements for personnel performing arterial punctures.
- 12.2 Define arterial blood gases (ABGs), and describe their diagnostic function.
- 12.3 List the equipment and materials needed to perform arterial punctures.
- 12.4 Define "steady state," and list additional patient information that must be recorded when performing blood gas determinations.
- 12.5 State four factors that should be considered when selecting a site for arterial puncture, and name the preferred site.
- 12.6 State the purpose of and steps for performing the modified Allen test.
- 12.7 Describe the steps in the performance of an arterial puncture.
- 12.8 State five technical errors associated with arterial puncture and the effect of each error on the specimen.
- 12.9 Discuss six complications of arterial puncture, including their effects on the patient and the precautions taken to avoid them.
- 12.10 List reasons for a specimen to be rejected.

Chapter 13 (1a-v, 1bii-v, 1c-ii 2c-iii)

- 13.1 Define point-of-care testing (POCT).
- 13.2 Discuss the advantages and disadvantages of POCT.
- 13.3 Explain Clinical Laboratory Improvement Amendments (CLIA) classification, regulatory requirements, and competency testing for POCT.
- 13.4 Describe quality management for POCT.
- 13.5 Discuss the function and types of quality control (QC) for POCT.

- 13.6 Identify critical elements for common point-of-care tests.
- 13.7 Demonstrate understanding of the three phases of laboratory testing.
- 13.8 List the tests and instrumentation commonly used in POCT.

Chapter 14 (1a-v, 1b-iii, 1c-i, 2a-i, 2c-iv)

- 14.1 Provide patients with instructions and containers for the collection of random, first-morning, clean-catch midstream, and 24-hour urine specimens.
- 14.2 Provide patients with instructions and containers for the collection of random and timed fecal specimens.
- 14.3 Provide patients with instructions and containers for the collection of semen specimens.
- 14.4 Correctly collect a throat culture.
- 14.5 Correctly obtain a nasopharyngeal (NP) specimen.
- 14.6 Describe the purpose of and the collection procedure for sweat electrolytes, including precautions to protect specimen integrity.
- 14.7 Describe the purpose of and the collection procedure for bone marrow specimens.
- 14.8 Discuss the major components and concerns of the blood donor selection process.
- 14.9 Describe the differences between the blood donor collection process and the routine venipuncture.
- 14.10 Describe the purpose of and the tests performed on various nonblood specimens.
- 14.11 Discuss the responsibilities of a phlebotomist when accessioning specimens into the laboratory and shipping specimens from the laboratory.
- 14.12 Describe the safety precautions associated with specimen processing.
- 14.13 State the rules for safe operation of a centrifuge.
- 14.14 State routine phlebotomy duties that can involve a phlebotomist in the use of a laboratory information management system.

Chapter 15 (1a-v, 1b-iii, 1c-i, 2a-i, 2c-iv)

- 15.1 Explain the role of the phlebotomist in complying with patients' rights.
- 15.2 Differentiate between ethics and medical law.
- 15.3 State the primary role of the phlebotomist in complying with the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and the Health Information Technology for Economic and Clinical Health (HITECH) Act.
- 15.4 Define legal terms.
- 15.5 Describe how a phlebotomist could be involved in a malpractice suit.
- 15.6 State examples of how informed consent is obtained.
- 15.7 Describe how a phlebotomist should respond to a patient who refuses a venipuncture.
- 15.8 Describe the requirement for obtaining consent for collection of a specimen for HIV testing.
- 15.9 Discuss the goals of a risk management department.
- 15.10 Define a sentinel event, and give examples of how a phlebotomist could be involved in such an event.

Chapter 16 (1a-v, 1b-iii, 1c-v, 2a-i, 2c-iv)

- 16.1 Differentiate between quality control (QC) and quality assessment (QA).
- 16.2 Discuss forms of documentation used in the phlebotomy department.
- 16.3 List the information contained in a procedure manual.
- 16.4 Describe how the procedure manual is used by the phlebotomist.
- 16.5 Discuss the role of variables in the development of a quality management program.
- 16.6 Differentiate among preexamination, examination, and postexamination variables related to the phlebotomist's scope of practice.
- 16.7 For each step of the phlebotomy collection procedure, state a QC procedure failure that can affect the collection of a quality specimen.
- 16.8 Describe a quality management system (QMS).
- 16.9 State and describe the 12 quality essentials used in a QMS.
- 16.10 Describe the purpose of quality indicators.
- 16.11 Describe how each of the six areas of the Lean system can benefit the phlebotomy department.

- 16.12 State the purpose of Six Sigma methodology in a management system.
- 16.13 Demonstrate knowledge of root cause analysis (RCA) as it relates to phlebotomy.

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. Lecture Quizzes
2. Lecture Exams
3. Lecture Final Exam
4. Laboratory Assignments
5. Final Venipuncture check-off (by simulation)

Methods of Instruction/Course Format/Delivery:

The lecture portion of this course is offered in an online format. However, there will be required laboratories as scheduled in the course listing for the semester. Students will be fully responsible with keeping track of all assignments due dates, lab dates and time, as well as being aware of the testing center times for the four mandatory proctored exams.

Students are expected to demonstrate basic competency in reading, writing, oral communication, math, and computer skills. Proficiency will be measured by quizzes, assignments, laboratory assignments and quizzes, three regular examinations and a comprehensive final exam.

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. Quizzes (Chapters 1-16)
2. Laboratory Assignments (done during lab)

Assessment(s):

1. Proctored Exam#1 (Chapters 1-5)
2. Proctored Exam #2 (Chapters 6-10)
3. Proctored Exam #3 (Chapters 11-16)
4. Comprehensive Final Exam (Chapters 1-16)
5. Final Venipuncture Check-off (simulation)

Course Grade:

The grading scale for this course is as follows:

Major Exams	40%
Chapter Quizzes	20%
Laboratory Assignments	25%
Comprehensive Final Exam /Final Venipuncture Check-off	<u>15%</u>
Total:	100%

Texts, Materials, and Supplies:

- Strasigner, Susan King, and Di Lorenzo, Marjorie Schaub. *The Phlebotomy Textbook*. 3rd Edition. ISBN 9780803699779

Required Readings:

- Text, Information given in Canvas Modules (videos, simulations, etc.), Information given during lab.

Recommended Readings:

- None.

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.