



DFTG 1325 - Blueprint Reading and Sketching Course Syllabus

Description

An introduction to reading and interpreting working drawings for fabrication processes and associated traders. Use of sketching techniques to create pictorial and multiple-view drawings.

Credits 3

Lecture Hours 2

Lab Hours 3

Extended Hours 0

Contact Hours 80

State Approval Code 15.1301

Instructor Name Laura Vance

Semester/Year Fall 2024

Meeting Time and Location

Online—students are expected to spend at least 6-9 hours per week reading, reviewing, and participating in assigned activities for successful completion of this course.

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.

Student Basic Needs

Unexpected circumstances may arise, but Panola College offers various resources to support students. If you need mental health services or are facing challenges with transportation, affording class materials and supplies, or accessing food regularly—issues that may impact your class performance—please visit panola.edu/resources.

Class Attendance

Regular and punctual attendance of classes and laboratories is required of all students. When a student has been ill or absent from class for approved extracurricular activities, he or she should be allowed, as far as possible, to make up for the missed work. If a student has not actively participated by the census date, they will be dropped by the instructor for non-attendance. This policy applies to courses that are in-person, online, hybrid, and hybrid.

Attendance in online courses is determined by submission of an assignment or participation in an activity. According to federal guidelines, simply logging into a distance learning course without participating in an academic assignment does not constitute attendance. Distance learning is defined as when a majority (more than 50%) of instruction occurs when the instructor and students are in separate physical locations. Students must engage in an academic activity prior to the course census date.

When an instructor feels that a student has been absent to such a degree as to invalidate the learning experience, the instructor may recommend to the Vice President of Instruction that the student be withdrawn from the course. Instructors may seek to withdraw students for non-attendance after they have accumulated the following number of absences:

Fall or spring semesters:

3 or more class meeting times per week - 5 absences

2 class meeting times per week - 3 absences

1 class meeting per week - 2 absences

The student is responsible for seeing that he or she has been officially withdrawn from a class. A student who stops attendance in a class without officially withdrawing from that class will be given a failing grade; consequently, the student must follow official withdrawal procedures in the Admissions/Records Office.

Please note: Health Science and Cosmetology courses may require more stringent attendance policies based on their accreditation agencies. Please see the addendum and/or program handbook for further information concerning attendance.

Pregnant/Parenting Policy

Panola College welcomes pregnant and parenting students as a part of the student body. This institution is committed to providing support and adaptations for a successful educational experience for pregnant and parenting students. Students experiencing a need for accommodations related to pregnancy or parenting will find a Pregnancy and Parenting Accommodations Request form in the Student Handbook or may request the form from the course instructor.

Artificial Intelligence (AI) Course Policy

Use of generated AI Permitted under some classroom circumstances with permission.

There are situations throughout the course where you may be asked to use artificial intelligence (AI) tools to explore how they can be used. Outside of those circumstances, you should not use AI tools to generate content that will end up in any student work (assignments, activities, discussion responses, etc.). In such cases for Option #2, no more than 25% of the student work should be generated by AI. Use of any AI-generated content in this course without the instructor's consent qualifies as academic dishonesty and violates Panola College's standards of academic integrity.

Instructional Goals and Purposes

The purpose of this course is to interpret working drawings including dimensions, notes, symbols, sections, and auxiliary views; and sketch pictorials and multi-view drawings. In addition, to provide an understanding of the various types of drawings used in multiple disciplines, such as, petroleum technology, electrical and instrumentation, construction and etc.; and knowledge of drawing-document change control; and a basic understanding of the relationship between drawings and technical procedures which reference and illustrate-support the drawings.

Learning Outcomes

1. Prints: The Language of Industry
2. Line conventions and lettering
3. Title blocks and parts lists
4. Geometric terms and construction
5. Multiview drawings
6. Section views
7. Auxiliary views
8. Screw thread representation
9. Dimensioning
10. Tolerancing
11. Welding prints
12. Instrumentation and control drawings
13. Basic technical sketching and lettering

Specific Course Objectives (includes SCANS)

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

1. **Prints: The Language of Industry.** (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C-ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Identify the importance of prints.
 - b. Discuss historical processes and current role of prints in the design process.
 - c. Explain the historical and current role of prints in the design process.
 - d. Identify and define terms related to prints.
 - e. Explain how prints are produced.
 - f. Identify two important elements of print reading.
 - g. Identify ways in which to care for prints.
 - h. Identify and discuss options for using prints in an electronic (digital) format.
 - i. Discuss the role of various organizations in the standardization of drawings.
 - j. Discuss trends in engineering documentation that may reduce the need for paper prints.
2. **Line conventions and lettering.** (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C-ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Identify the standard alphabet of lines.
 - b. Describe the types of lines by appearance and purpose.
 - c. Identify the style of lettering recommended for standard industrial drawings.
3. **Title blocks and parts lists.** (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C-ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Describe drawing sheet sizes and formats.
 - b. Identify marginal information and zoning methods for drawing sheets.
 - c. Identify the elements of the title block as defined by industry standards.
 - d. Explain the techniques for identifying parts of an assembly drawing as represented in a basic parts list.
4. **Geometric terms and construction.** (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C-ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Define terms related to the geometry of industrial drawings.
 - b. Describe orientation relationships found within two-dimensional and three-dimensional geometry.
 - c. List various properties of geometric constructions.
 - d. Identify two-dimensional geometric shapes.
 - e. Identify three-dimensional geometric shapes.
 - f. Identify specialized geometric elements that are used in product design.
5. **Multiview drawings.** (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C-ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Define spatial visualization.
 - b. Explain the relationship between an orthographic projection and a multiview drawing.
 - c. Identify and define the three dimensions of an object.
 - d. Define the six principal views and the three regular views.
 - e. Identify the three principal projection planes.
 - f. Explain three visualization principles for multiview drawings.
 - g. Identify the three types of flat surfaces.
 - h. Explain characteristics of cylindrical surfaces.
 - i. Explain characteristics of fillets, rounds, and runouts.
 - j. Identify differences between third-angle and first-angle projection.
 - k. Discuss computer-generated views.
6. **Section views.** (1 A-I, 1A-ii, 1A-iv, 1B-iii, 1B-iv, 1C-I, 1C-iv, 2A-I, 2A-iii, 2B-I, 2C-i, 2C-ii, 2C-iii, 2D-ii, 2D-iii, 2E-ii)
 - a. Explain the characteristics of a drawing that features a full section view.
 - b. Describe the characteristics of a half section view.
 - c. Describe the characteristics of an offset section view.
 - d. Identify the characteristics of a sectional view that features aligned features.
 - e. Identify the characteristics of a view that features a broken-out section.
 - f. Compare revolved sections and removed sections and identify the characteristics of these sections.

- g. Explain conventional practices applied to section views.
 - h. Identify the proper representation of partial sections and outline sections.
 - i. Identify the proper representation of separate parts in an assembly section view.
 - j. Discuss computer-generated section views.
7. **Auxiliary views.** (1 A-I, 1A-II, 1A-IV, 1B-III, 1B-IV, 1C-I, 1C-IV, 2A-I, 2A-III, 2B-I, 2C-I, 2C-II, 2C-III, 2D-II, 2D-III, 2E-II)
- a. Explain the purposes of auxiliary views.
 - b. Identify auxiliary views and explain their relationship to principal views.
 - c. Discuss terms related to auxiliary view projection.
 - d. Read prints that incorporate auxiliary views.
 - e. Discuss computer-generated auxiliary views.
8. **Screw thread representation.** (1 A-I, 1A-II, 1A-IV, 1B-III, 1B-IV, 1C-I, 1C-IV, 2A-I, 2A-III, 2B-I, 2C-I, 2C-II, 2C-III, 2D-II, 2D-III, 2E-II)
- a. Define terms related to screw threads and fasteners.
 - b. Identify common screw thread forms.
 - c. Describe three methods for representing screw threads.
 - d. Discuss screw thread characteristics that may affect the specification.
 - e. Explain the different parts of a screw thread specification or callout.
 - f. Discuss the differences between metric threads and inch threads.
 - g. Identify standard pipe thread representation and designations.
 - h. Describe computer-generated thread representations.
9. **Dimensioning.** (1 A-I, 1A-II, 1A-IV, 1B-III, 1B-IV, 1C-I, 1C-IV, 2A-I, 2A-III, 2B-I, 2C-I, 2C-II, 2C-III, 2D-II, 2D-III, 2E-II)
- a. Identify terms and measurements associated with dimensioning mechanics.
 - b. Identify symbols that have been standardized for dimensioning notations.
 - c. Explain the choice and placement rules drafters use when creating dimensions.
 - d. Identify and discuss various systems and methods for dimensioning.
 - e. Describe additional types of dimensions used in special ways.
 - f. Discuss alternative methods for describing size and applying dimensions.
10. **Tolerancing.** (1 A-I, 1A-II, 1A-IV, 1B-III, 1B-IV, 1C-I, 1C-IV, 2A-I, 2A-III, 2B-I, 2C-I, 2C-II, 2C-III, 2D-II, 2D-III, 2E-II)
- a. Define terms related to tolerancing.
 - b. Explain how tolerances are expressed on a drawing.
 - c. Identify tolerance values for dimensions on the drawing, regardless of the tolerancing expression.
 - d. Compare customary inch tolerance classes with metric tolerance classes.
 - e. Calculate tolerances or limits for mating parts based on maximum material conditions and allowance.
11. **Welding prints.** (1 A-I, 1A-II, 1A-IV, 1B-III, 1B-IV, 1C-I, 1C-IV, 2A-I, 2A-III, 2B-I, 2C-I, 2C-II, 2C-III, 2D-II, 2D-III, 2E-II)
- a. Identify a welding symbol.
 - b. List the elements of a welding symbol.
 - c. Explain the meaning of a welding symbol.
 - d. Identify the basic weld symbols used in welding symbols.
 - e. Discuss other welding applications.
12. **Instrumentation and control drawings.** (1 A-I, 1A-II, 1A-IV, 1B-III, 1B-IV, 1C-I, 1C-IV, 2A-I, 2A-III, 2B-I, 2C-I, 2C-II, 2C-III, 2D-II, 2D-III, 2E-II)
- a. Describe the types of control diagrams.
 - b. Identify symbols used on fluid power diagrams.
 - c. Recognize supplementary information accompanying circuit diagrams.
 - d. Read a graphic diagram.
 - e. Interpret graphic diagrams for fluid control devices.
13. **Basic technical sketching and lettering.** (1 A-I, 1A-II, 1A-IV, 1B-III, 1B-IV, 1C-I, 1C-IV, 2A-I, 2A-III, 2B-I, 2C-I, 2C-II, 2C-III, 2D-II, 2D-III, 2E-II)
- a. Identify the materials to create a technical sketch.
 - b. Discuss the proper methods for sharpening a pencil.
 - c. Discuss the proper methods for holding a pencil for sketching.
 - d. Sketch horizontal, vertical, and inclined lines.

- e. Sketch arcs, circles, and ellipses.
- f. Identify aids used for freehand technical sketching.
- g. Read and sketch Gothic-style technical lettering.
- h. Identify and use guidelines for lettering.
- i. Discuss the proper spacing methods for lettering.

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. Students will study assigned materials and complete quizzes and exams to assess understanding and comprehension.
2. Students will complete all lab assignments as scheduled and all students are required to wear Personal Protective Equipment (PPE) in the lab.

Methods of Instruction/Course Format/Delivery

Students in traditional, hybrid and Internet classes will have access to courses via Canvas. Students in the traditional class will meet regularly for lectures. Students in the Internet class will be required to take quizzes and exams at an approved testing facility or, they may also be administered by the instructor. Students in hybrid classes will have both in-class and online assignments. Hybrid classes are required to read the assigned material, take quizzes and exams as assigned by the instructor, and complete assigned homework prior to meeting for the face to face labs. Resources for this course, provided through Canvas, include the following Sections in Canvas...

- Modules: Chapter study materials, self-assessment exercises, quizzes and exams
- Announcements and Recent Activities List: Instructor Announcements
- Inbox: Email (to communicate with instructor and classmates inside Canvas)
- Grades: Student grades
- Other sections, as assigned by the Instructor: Students in both the traditional and Internet classes should use the People feature within Canvas (includes Canvas Email) to communicate with the instructor. Using Canvas Email located in the "Inbox" menu gives the student access to the instructor and other classmates without having to remember or type email addresses; the student just selects a name from the list. The instructor will attempt to respond to all Canvas email within 24 hours. For example, if a student makes an appointment with the instructor through Canvas email to take an exam, the instructor will reply to the student's Canvas email – if the instructor does not reply within the time needed, call the instructor's at his or her office. Please, always include in the subject line of the Canvas email, the student's name, course number, and course section number.

Major Assignments/Assessments

The following items are assigned and assessed during the semester and used to calculate the student's final grade.

Assignments

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

- **Quizzes and Homework Assignments**

Students will read the required material and complete quizzes and assignments over the content. The ability to makeup late quizzes and assignments will be determined by the instructor for a reduced

score.

- **Tests**

Multiple tests will be administered during the semester. Some tests during the semester will be proctored. Tests that are missed due to an unexcused absence will be given a reduced score. See the grading notes for more information.

- **Final Exam**

The Final Exam will be cumulative and will be proctored.

Assessments

Grading Notes:

Late Work: All listed assignments are due according to the due date provided in Canvas and on the course calendar if you do not complete the assignments on time a 10% per day penalty will automatically be applied to all assignments. If you have missed an assignment due to an approved class absence please contact your instructor for further instructions.

Late work for an unexcused absence: There will be a 10 point reduction in the score if the assignment is turned in after the listed due date and time. (Example: The assignment is due at 1 pm and you submit it at 4 pm you will receive a 10 point deduction from the original score.) There will also be a 10 point deduction for everyday the assignment is late. (Example: If you turn in the assignment 3 days late you will receive a 30 point deduction from your original score.)

Missed Exams: Missed exams due to legitimate reasons should be taken prior to the reporting of a midterm or final grade as applicable. It is the responsibility of the student to reschedule the makeup with the instructor. The Instructor reserves the right to change the test format of any makeup. Instructors are not required to issue makeup work for an unexcused class absence Instructor also reserves the right to give full or partial credit for any makeup work that is allowed and that resulted from an unexcused absence.

Missed Quizzes: Missed quizzes due to legitimate reasons should be rescheduled within one week of the scheduled quiz or a date assigned by the Instructor. It is the responsibility of the student to reschedule makeup quizzes. The Instructor reserves the right to change the test format of the makeup quiz. The instructor is not required to make up work for unexcused class absences. The instructor reserves the right to give full or partial credit for any makeup work that is allowed and that resulted from an unexcused absence.

NO MAKEUP WORK WILL BE ACCEPTED DURING FINALS WEEK.

Attendance: Attendance is based on the student missing no more than 10% out of the semester without a valid excuse. After the 10%, the instructor may withdraw the student at their discretion. Any student thirty or more minutes late will be counted absent. Students that leave before class is dismissed will be counted absent. The Instructor reserves the right to dock points for any missed class without a legitimate excuse. Students that leave before class is dismissed will be counted absent.

You will also be expected to show up to class on time each day. After accumulating three tardies, each tardy will count as an unexcused absence.

Excused absences are those due to a pre-approved school sponsored trip, a death in the family (you will need a funeral pamphlet) or a sickness (in which case a doctor's note is required).

For face-to-face classes that meet once a week:

Attendance will be mandatory. Roll will be taken at the beginning of every class. At the end of the semester, any student who has **two unexcused absences** will be penalized **one letter grade**. If a student accumulates **three or more unexcused absences**, the grade for the class will be an automatic "F".

Plagiarism: Plagiarism shall be defined as appropriating, buying, receiving as a gift or obtaining by any other means another person's work and the unacknowledged submission or incorporation of it in one's own written work. Plagiarism in this class consists of copying another student's files and using them as your own, copying another student's projects and using it as your own, downloading a completed file and using it as your own, and/or having someone complete the work for you and using it as your own. Plagiarism will not be tolerated and will result in an automatic "F" for the course.

All papers submitted to Canvas will be scanned with turnitin.com and the instructor reserves the right to dock points based on the results.

Cheating: Cheating on a test shall include:

- a. Copying from another student's test
- b. Using test materials not authorized by the person administering the test
- c. Collaborating with or seeking aid from another student during a test without permission from the test administrator
- d. Knowingly using, buying, selling, stealing, or soliciting, in whole or in part, the contents of an unadministered test.
- e. The unauthorized transporting or removal, in whole or in part, of the contents of the unadministered test.
- f. Substituting for another student, or permitting another student to substitute for one's self, to take a test.
- g. Bribing another person to obtain an unadministered test or information about an unadministered test absolutely no cheating is tolerated.
- h. If a student is observed cheating they will be sent home immediately counted absent and given a zero on the assignment they were cheating on.

Cheating in this course will not be tolerated and can result in a "F" for the course.

Class Conduct: All cell phones should be turned off in all classes. If you must receive a call notify your instructor and step out of the classroom. No cell phones are allowed during testing. The use of cell phones (texting, calls, internet, ect.) during class will result in 5 points being taken from the students' Test grade for every offense.

No disruptive behavior is allowed in class; if a student is being disruptive as determined by the instructor one warning will be given. If the behavior persists, the student will be sent home and counted absent. Asking of questions and discussion of relevant information in and outside class is highly encouraged; however, talking to neighbors, texting, sleeping, foul language or studying for other courses during class time will not be tolerated.

Students will be dropped after the 12th class day if they have not completed an assignment.

Some mandatory meetings outside of class days and time may be required to attend for credit. Valid excuses must be submitted with proof via email to your professor to avoid grade penalties.

Course Grade

The grading scale for this course is as follows:\

Category Percentage:

- Homework Quizzes – 30%
- Unit Quizzes – 30%
- Exams – 40%

Texts Materials, and Supplies

- *Print Reading for Industry, 11th Edition, Walter C. Brown / Ryan K. Brown,*

ISBN 978-1645646723 (Includes Large Prints Packet)

Required Readings

- *Print Reading for Industry, 11th Edition, Walter C. Brown / Ryan K. Brown,*

ISBN 978-1645646723 (Includes Large Prints Packet)

Other

- Courses conducted via video conferencing may be recorded and shared for instructional purposes by the instructor.
- For current texts and materials, use the following link to access bookstore listings: <https://www.panolacollegestore.com>.
- For testing services, use the following link: <https://www.panola.edu/student-services/student-support/academic-testing-center>.
- 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 Charles C. Matthews Student Center or go to <https://www.panola.edu/studentservices/student-support/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: <https://www.panola.edu/> (located on at the bottom under student)

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 timeline 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 databases 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.