

## COURSE SYLLABUS

**Course Title:** AUMT 1316-272 Suspension & Steering Systems (3:1:8)  
**Semester/Year:** Fall 2019  
**Instructor:** Mr. Gary Ham  
**Office:** Lubbock Center, Room 136B  
**Phone/e-mail:** 806-716-2296 gham@southplainscollege.edu  
**Office Hours:** Check posted hours after classes begin or by appointment.

### SOUTH PLAINS COLLEGE IMPROVES EACH STUDENTS LIFE

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#### I. GENERAL COURSE INFORMATION

- A. **Course Description: (3:1:8)** this course covers the theory and operation of automotive suspension and steering systems, including tire and wheel problem diagnosis, component repair, and alignment procedures. Also covered are diagnosis and repair of electronic load leveling systems, front and rear suspension systems, proper nomenclature and operation of all existing components. Elements of the course may be taught manufacturer specific.
- B. **Course Goals/Objectives:** Utilizing appropriate safety procedures, the student will identify and diagnose system components ; repair or replace system components; perform two and four wheel alignments
- C. **Course Competencies:** A = 100-90 B = 89-80 C = 79-70 F = 69 or below. A grade of “C” or higher is required in AUMT 1316 in order to earn a specialty certificate in Suspension & Steering
- D. **Academic Integrity:** It is the aim of the faculty of South Plains College to foster a spirit of complete honesty and a high standard of integrity. The attempt of any student to present as his own, any work which he has not honestly performed, is regarded by the faculty and administration as a most serious offense and renders the offender liable to serious consequences, possibly suspension. For further information concerning Cheating and Plagiarism, read the section on Academic Integrity in the SPC General Catalog. **If you have a question as to whether you may work with other students on an assignment, ASK YOUR INSTRUCTOR. On some assignments, working with others is encouraged.**
- E. **SCANS and Foundation Skills:** Specific SCANS competencies and foundation skills applicable to this course are listed adjacent to each objective in the course objective table. They include: Foundation Skills (F): 1,2,3,5,6,8,9,10,11,12. Competencies(C): 5,6,7,11,14,15,16,17,18,19,20. A complete list of SCANS competencies and foundation skills is attached at the end of this syllabus.

F. **Verification of Workplace Competencies-Technical Education Division.** The learning outcomes of this course will prepare the student to meet the competencies measured in a comprehensive elective course experience (Course #s AUMT 1366 , or AUMT 2366). In addition the student will also be prepared to take the ASE Student Certification test for Steering and Suspension Systems.

## II. SPECIFIC COURSE/INSTRUCTOR REQUIREMENTS

### A. **Textbook & Other Required Materials:**

Halderman, James D. Automotive Technology Principles, Diagnosis, and Service, Fifth Edition, Pearson Publishers, 2016 (with on-line curriculum)  
8 ½ x 11 notebook for classroom note taking and assignments  
Clear Safety Glasses.

- B. **Class Attendance Policy:** Students are expected to attend all classes in order to be successful in a course. The student may be administratively withdrawn from the course when absences become excessive **without notice, there are no excused absences. Excessive absences means 4 (four) or more absences for any reason. Upon the 5<sup>th</sup> absence, each student will lose 10 points off of their current GPA, the 6<sup>th</sup> absence an additional 10 points, and the 7<sup>th</sup> absence an additional 10 points. Excessive absences cause you to miss key points of a class and show you are not reliable/dependable for employment. Two (2) tardies will count as one absence. Leaving class without notifying your instructor is considered an absence, regardless of the time you left.**

When an unavoidable reason for class absence arises, such as illness, an official trip authorized by the college or an official activity, the instructor may permit the student to make up work missed. It is the student's responsibility to complete work missed within a reasonable period of time as determined by the instructor. Students are officially enrolled in all courses for which they pay tuition and fees at the time of registration. Should a student, for any reason, delay in reporting to a class after official enrollment, absences will be attributed to the student from the first class meeting.

Students who enroll in a course but have "Never Attended" by the official census date, as reported by the faculty member, will be administratively dropped by the Office of Admissions and Records. A student who does not meet the attendance requirements of a class as stated in the course syllabus and does not officially withdraw from that course by the official census date of the semester, may be administratively withdrawn from that course and receive a grade of "X" or "F" as determined by the instructor.

It is the student's responsibility to verify administrative drops for excessive absences through MySPC using his or her student online account. If it is determined that a student is awarded financial aid for a class or classes in which the student never attended or participated, the financial aid award will be adjusted in accordance with the classes in which the student did attend/participate and the student will owe any balance resulting from the adjustment.

- C. **Assignment Policy:** All assignments are due at the beginning of class on the due dates unless otherwise instructed. Assignments may include on-line or off-line review questions, short essay questions, and definitions. **Part of these assignments can be on-line through the on-line curriculum, you should log on to the on-line curriculum at the beginning of the semester in order to complete them on time. There may be no makeup assignments and no late assignments accepted.**

The dates printed in this syllabus can change. Every effort will be made to inform the students of those changes, but the students are ultimately responsible for all assignments regardless of any changed dates. Please check the dates with your instructor throughout the course.

- D. **Grading Policy/Procedure and /or Methods of Evaluation:** All exams, including the final exam are mandatory for effective student evaluation. Exams will be objective and will cover both theory and practical skills pertaining to all aspects of the material presented. Adequate study time should be set aside for exam reviews. **There may be No makeup exams given. If a student's financial records are not clear at the time of the final examination, the student will not be allowed to take the final exam.** The NA3SA certification test mentioned above can be used in place of your final exam.

You will be evaluated during this course by the following method:

Unit exams, written assignments, pop quizzes, and attendance = 25%

Unit skills tests and/or lab sheets = 50% (approximately 4)

Final Exam: 25%

A unit skills test is a measure of how well you follow instructions, your safety in the shop, your use of tools, your cleanliness in the work area, and your attention to detail while you perform diagnostics or repairs within a required time period. **If you're late for a skills test the following will happen; 0 to 5 minutes late = -10pts; more than 5 min. but less than 10 min. late = -20pts; more than 10 min. but less than 15 min. late = -30pts. If you are more than 15 minutes late you will have earned a "0" for the test.**

A task sheet will be used to plan and track students while they perform required skills in the shop. This is not used to average your grade, but it is a professional evaluation of how well you work independently and your level of expertise in completing assigned tasks. Prospective employers will want to see this during an interview, so please follow the shop and repair procedures to the best of your ability.

- E. **Special Requirements: A student's conduct is expected to follow the guidelines stated in the college catalogue and student handbook, any deviation will result in immediate disciplinary action. No smoking, chewing, or dipping is permitted in the building or outside the back doors of the shop and food and drinks are not allowed in any classroom, lab, or shop.** All these activities will be limited to break time in designated areas only. Breaks will be limited to 20 minutes. Do not park on the back lot unless preauthorized by your instructor, unauthorized vehicles can be towed at the owner's expense.

**Dress Code:** The Automotive Program requires you to dress appropriately. Flip flops or opened toed shoes are not allowed in the shop, proper foot attire should be worn to protect your feet, leather work boots are recommended. Jeans/ pants will be worn so that neither one falls to your thighs or knees, belts must hold them at your waist line. Safety glasses will be worn at all times in the shop. If a student fails to comply with the above dress code, he or she, will be sent home and given an absence for that day.

## **LUBBOCK CAMPUS GUIDELINES**

### **CHILDREN ON CAMPUS**

Many of the students attending classes at South Plains College - Lubbock Camps are also parents who value the opportunity to participate in higher education. Sometimes students are faced with the decision of whether to remain at home with their children, bring children with them to class, or be absent from class. The following guidelines address concerns for the safety of children on campus and provide for an environment conducive to learning.

### **CHILDREN IN THE CLASSROOM**

**Students are not allowed to bring children to class** and will be asked to leave in the interest of providing an environment conducive for **all** students enrolled in the class. Students are responsible for adherence to the attendance requirements set forth by the instructor in the course syllabus.

### **UNATTENDED CHILDREN ON CAMPUS**

**Children may not be left unattended.** In order to provide for the safety of children on campus, parents or other guardians are responsible for supervising children while utilizing services or conducting business on campus.

### **DISRUPTIVE CHILDREN**

**Disruptive children will not be allowed to interfere with college business.** Parents or other guardians are responsible for supervising and controlling the behavior of children they have brought on campus.

## **Diversity Statement**

In this class, the teacher will establish and support an environment that values and nurtures individual and group differences and encourages engagement and interaction. Understanding and respecting multiple experiences and perspectives will serve to challenge and stimulate all of us to learn about others, about the larger world and about ourselves. By promoting diversity and intellectual exchange, we will not only mirror society as it is, but also model society as it should and can be.

## **ADA Statement**

Students with disabilities, including but not limited to physical, psychiatric, or learning disabilities, who wish to request accommodations in this class should notify the Disability Services Office early in the semester so that the appropriate arrangements may be made. In accordance with federal law, a student requesting accommodations must provide acceptable documentation of his/her disability to the Disability Services Office. For more information, call or visit the Disability Services Office at Levelland (Student Health & Wellness Office) 806-716-2577, Reese Center (Building 8) & Lubbock Center 806-716-4675, or Plainview Center (Main Office) 806-716-4302 or 806-296-9611.

### **GENERAL SAFETY ON CAMPUS**

South Plains College recognizes the importance of safety on campus. The protection of persons and property is a responsibility which we all share. Personal safety begins with the individual. The following guidelines are intended to assist you in protecting yourself and to encourage practices that contribute to a safe environment for our campus community.

- 1 Never leave your personal property unsecured or unattended.
- 2 Look around and be aware of your surroundings when you enter and exit a building.
- 3 Whenever possible, avoid walking alone, particularly after dark. Walk to your vehicle with other class members or request that the Security Guard walk you to your car.
- 4 When approaching your vehicle, keep your keys in your hand; look under your car and in the back seat and floorboard. Lock the doors as soon as you are inside your car.

### **FOOD AND DRINK IN CLASSROOMS**

It is the policy of South Plains College not to permit food or drink in the classrooms or laboratories.

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| <p><b>In case of emergency, contact the following numbers, but DO NOT leave a voice mail message.</b><br/><b>716-4677, - ATC    716-2923, - Reese Center (mobile 806-893-5705)</b></p> |
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| <p>F1,2,5,6,9,12<br/>F1,2,5</p> <p>F1,2,5,12</p> <p>F1,2,5,8-10,12</p> <p>F1,2,5,8-12</p> <p>F1,2,5,8-12<br/>F1,2,5,9,12</p> <p>F1,2,5,8</p>                                    | <p><b>Course Objectives:</b><br/>Upon completion of this course, you should be able to:</p> <ul style="list-style-type: none"> <li>• Discuss the function of steering and suspension systems.</li> <li>• Explain why it is important to maintain proper alignment of the steering system.</li> <li>• Understand the need for safety during repair and practice safe working habits.</li> <li>• Use service manuals and manufacturers' specifications to properly complete steering and suspension tasks.</li> <li>• Diagnose problems associated with both the steering and suspension systems.</li> <li>• Discuss and demonstrate how alignments are performed.</li> <li>• Name the components of the steering and suspension systems and discuss the purpose of each.</li> <li>• Discuss special handling requirements for towing, jacking, and lifting.</li> </ul>                                          | <p>C5,6,7,15<br/>C5,6,7,15</p> <p>C5,7</p> <p>C5-7,15,18-20</p> <p>C5-7,15,18-20</p> <p>C5-7,15,18-20<br/>C5,7,15</p> <p>C5,7</p>         |
| <p>F1,2,5,6,10<br/>F1,2,5,6<br/>F1,2,5,6<br/>F1,2,5,6</p> <p>F1,2,5,6<br/>F1,2,5,6<br/>F1,2,5,6,8,9,12<br/>F1,2,5,6,8,9,12</p> <p>F1,2,5,6,8,9,12<br/>F1,2,5,6<br/>F1,2,5,6</p> | <p><b>Content Outline:</b></p> <p><b>Unit I: Introduction to Under car Systems</b><br/>Unit Objectives:<br/>Upon completion of this unit, you will be able to:</p> <ul style="list-style-type: none"> <li>• Discuss the functions of steering and suspension systems.</li> <li>• Explain the importance of maintaining proper wheel alignment.</li> <li>• Discuss shop safeties factors, and follow safe working procedures.</li> <li>• Discuss the different types of lubricants used in steering and suspension systems.</li> <li>• Discuss the different types of seals and their uses.</li> <li>• Discuss the different types of bearings and their uses.</li> <li>• Inspect and replace wheel bearings.</li> <li>• Inspect and replace wheel-bearing seals.</li> <li>• Inspect and replace axle seals.</li> <li>• Discuss the axes of movement.</li> <li>• Discuss over steer and under steer.</li> </ul> | <p>C5,7,15<br/>C5,7,15<br/>C5,7,15</p> <p>C5,7,15<br/>C5,7,15<br/>C5,7,15<br/>*C5,7,15,16,<br/>19,20<br/>C5,7,15<br/>*</p> <p>C5,7,15</p> |

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|                                                                                                                                     | <b>Unit II: Wheel and Tire Diagnosis and Repair</b><br>Unit Objectives:<br>Upon completion of this unit, you will be able to:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                   |
| F1,2,5,6,12<br>F1,2,5,6,12                                                                                                          | <ul style="list-style-type: none"> <li>Discuss the different tire ratings in use today.</li> <li>Diagnose tire wear problems and determine needed repairs.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | C5,7,15<br>C5,7,15,16,19,20                                                                                                       |
| F1,2,5,6,12<br>F1,2,5,6,8-12<br>F1,2,5,6<br>F1-6<br>F1,2,5,6,8,9,12<br>F1,2,5,6,8,9,12<br>F1,2,5,6,8,9,12                           | <ul style="list-style-type: none"> <li>Inspect tires and adjust air pressure correctly. Diagnose tire pressure monitoring systems</li> <li>Diagnose wheel and tire vibration problems.</li> <li>Rotate tires correctly.</li> <li>Measure run out of wheel and tire assemblies.</li> <li>Diagnose tire pull problems.</li> <li>Perform static and dynamic wheel balancing.</li> <li>Correctly install and torque wheel assemblies.</li> </ul>                                                                                                                                                                                                                                                                                                                         | C5,7,15,16<br>C5,7,15-20<br>C5,7,15<br>C5,7,15<br>C5,7,15-20<br>C5,7,15<br>C5,7,15,16,19,20                                       |
|                                                                                                                                     | <b>Unit III : Front and Rear Suspension Components and Service</b><br>Unit Objectives:<br>Upon completion of this unit, you will be able to:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                   |
| F1,2,5,8<br>F1,2,5,8<br>F1,2,5,8                                                                                                    | <ul style="list-style-type: none"> <li>Distinguish between a conventional frame and a unibody.</li> <li>Identify and discuss the different types of springs.</li> <li>Discuss the difference between sprung and unsprung weight as it relates to suspension.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | C5,7,15<br>C5,7,15<br>C5,7,15                                                                                                     |
| F1,2,5,8                                                                                                                            | <ul style="list-style-type: none"> <li>Identify and discuss the function of shocks, bushings, and stabilizers.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | C5,7,15                                                                                                                           |
| F1,2,5,8<br>F1,2,5,8<br>F1,2,5,8<br>F1,2,5,8-12<br>F1,2,5,8-12<br>F1,2,5,8-12<br>F1,2,5,8<br>F1,2,5,6,8<br>F1,2,5,6,8<br>F1,2,5,6,8 | <ul style="list-style-type: none"> <li>Discuss the function of coil spring system components.</li> <li>Distinguish between torsion bar suspension and coil spring suspension.</li> <li>Identify a Macpherson strut suspension system.</li> <li>Determine the cause(s) of typical front suspension.</li> <li>Perform a road test to aid in diagnosis.</li> <li>Inspect, diagnose, and service Macpherson Struts.</li> <li>Identify and service rear coil and leaf springs.</li> <li>Identify and discuss the three types of rear suspensions.</li> <li>Service front and rear shock absorbers.</li> <li>Service front and rear stabilizers and control arms and bushings.</li> <li>Discuss electronically controlled or air controlled suspension systems.</li> </ul> | C5,7,15<br>C5,7,15<br>C5,7,15<br>C5,7,14-20<br>C5,7,14-20<br>C5,7,14-20<br>C5,7,15<br>C5,7,15<br>*<br>C5,7,15,16,19,20<br>C5,7,15 |
| F1,2,5,6,8                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                   |

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|             | <b>Unit IV: Wheel Alignment Diagnosis, Adjustment, and Repair</b><br>Unit Objectives: Upon completion of this unit, you will be able to: |            |
| F1,2,5,6,12 | <ul style="list-style-type: none"> <li>• Discuss the need for correct alignment service.</li> </ul>                                      | C5,7,15    |
| F1,2,5,6,12 | <ul style="list-style-type: none"> <li>• Discuss how caster, camber, and toe affect steering control and tire wear.</li> </ul>           | C5,7,15    |
| F1-6,12     | <ul style="list-style-type: none"> <li>• Diagnose vehicle steering problems and determine needed repairs.</li> </ul>                     | C5,7,15    |
| F1-6,12     | <ul style="list-style-type: none"> <li>• Measure vehicle ride height and determine needed repairs.</li> </ul>                            | C5,7,15,16 |
| F1-6,12     | <ul style="list-style-type: none"> <li>• Check and adjust front and rear camber.</li> </ul>                                              | C5,7,15,16 |
| F1-6,12     | <ul style="list-style-type: none"> <li>• Check and adjust caster.</li> </ul>                                                             | C5,7,15,16 |
| F1-6,12     | <ul style="list-style-type: none"> <li>• Check and adjust front and rear toe.</li> </ul>                                                 | C5,7,15,16 |
| F1-6,12     | <ul style="list-style-type: none"> <li>• Center a steering wheel.</li> </ul>                                                             | C5,7,15,16 |
| F1-6,12     | <ul style="list-style-type: none"> <li>• Check toe-out-on turns.</li> </ul>                                                              | C5,7,15,16 |
| F1-6,12     | <ul style="list-style-type: none"> <li>• Check steering axis inclination.</li> </ul>                                                     | C5,7,15,16 |
| F1,2,5,6,12 | <ul style="list-style-type: none"> <li>• Check, adjust, or repair front-to-rear wheel tracking.</li> </ul>                               | C5,7,15,16 |

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|                | <b>Unit V: Steering System Diagnosis and Repair</b><br>Unit Objectives:<br>Upon completion of this unit, you will be able to:                               |                   |
| F1,2,5,8       | <ul style="list-style-type: none"> <li>Inspect steering gear system fluid levels and adjust according to manufacturer specifications.</li> </ul>            | C5,7              |
| F1,2,5,8-10,12 | <ul style="list-style-type: none"> <li>Inspect, adjust, and replace a power steering pump drive belt.</li> </ul>                                            | C5,7,15,16        |
| F1,2,5,8-10,12 | <ul style="list-style-type: none"> <li>Diagnose and repair fluid leakage problems.</li> </ul>                                                               | *C5,7,15,16,19,20 |
| F1,2,5,8-10,12 | <ul style="list-style-type: none"> <li>Perform a power steering pump pressure test and determine needed repairs.</li> </ul>                                 | *                 |
| F1,2,5,8-10,12 | <ul style="list-style-type: none"> <li>Remove, inspect, and repair a power steering pump assembly.</li> </ul>                                               | *                 |
| F1,2,5,8-10,12 | <ul style="list-style-type: none"> <li>Inspect and replace mounting bushings and brackets on a rack and pinion gear assembly.</li> </ul>                    | *                 |
| F1,2,5,8-12    | <ul style="list-style-type: none"> <li>Diagnose problems in rack and pinion gearboxes and determine needed repairs.</li> </ul>                              | C5,7,11,14,15     |
| F1,2,5,8-12    | <ul style="list-style-type: none"> <li>Adjust a rack and pinion steering gear assembly.</li> </ul>                                                          | C5,7,15,16        |
| F1,2,5,8-12    | <ul style="list-style-type: none"> <li>Inspect and replace inner bellows and tie rods on a rack and pinion gear assembly.</li> </ul>                        | *                 |
| F1,2,5,8-12    | <ul style="list-style-type: none"> <li>Inspect, adjust, or replace a power steering control valve.</li> </ul>                                               | *                 |
| F1,2,5,8-12    | <ul style="list-style-type: none"> <li>Inspect and replace a pitman arm.</li> </ul>                                                                         | *                 |
| F1,2,5,8-12    | <ul style="list-style-type: none"> <li>Inspect and replace a center link, tie rods and adjust.</li> </ul>                                                   | *                 |
| F1,2,5,8-12    | <ul style="list-style-type: none"> <li>Inspect and replace an idler arm assembly.</li> </ul>                                                                | *                 |
| F1,2,5,8-12    | <ul style="list-style-type: none"> <li>Diagnose problems in conventional steering gear boxes and determine needed repairs.</li> </ul>                       | C5,7,11,14,15     |
| F1,2,5,8-12    | <ul style="list-style-type: none"> <li>Adjust bearing preload and sector lash on a conventional gearbox.</li> </ul>                                         | C5,7,15,16        |
| F1,2,5,8-12    | <ul style="list-style-type: none"> <li>Discuss 4 wheel steering operation.</li> </ul>                                                                       | C5,7,15           |
| F1,2,5,8-12    | <ul style="list-style-type: none"> <li>Discuss alignment procedures on 4 wheel steering systems.</li> </ul>                                                 | C5,7,15           |
| F1,2,5,8-12    | <ul style="list-style-type: none"> <li>Diagnose problems in rack and pinion gearboxes and determine needed repairs on Hybrid Electronic steering</li> </ul> | C5,7,11,14,15     |

## AUMT 1316

### III. COURSE OUTLINE/CONTENT

#### Unit 1

Chapter 109 Tires and Wheels

Chapter 110 Tire Pressure Monitoring Systems

Chapter 111 Tire and Wheel Service

Chapter 112 Suspension System Principles and Components

#### Unit 2

Chapter 119 Wheel Alignment Principles

Chapter 120 Alignment Diagnosis and Service

Chapter 113 Front Suspensions and Service

Chapter 114 Rear Suspensions and Service

#### Unit 3

Chapter 115 Electronic Suspension Systems

Chapter 116 Steering Columns and Gears

Chapter 117 Steering Linkage and Service

Chapter 118 Electric and Hydraulic Power Steering Systems

**FINAL EXAM—DECEMBER 10th @ 6:30pm**

### SCANS COMPETENCIES

- C-1 **TIME** - Selects goal - relevant activities, ranks them, allocates time, prepares and follows schedules.
- C-2 **MONEY** - Uses or prepares budgets, makes forecasts, keeps records and makes adjustments to meet objectives.
- C-3 **MATERIALS AND FACILITIES** - Acquires, stores, allocates, and uses materials or space efficiently.
- C-4 **HUMAN RESOURCES** - Assesses skills and distributes work accordingly, evaluates performances and provides feedback.

### **INFORMATION - Acquires and Uses Information**

- C-5 Acquires and evaluates information.
- C-6 Organizes and maintains information.
- C-7 Interprets and communicates information.
- C-8 Uses computers to process information.

### **INTERPERSONAL–Works With Others**

- C-9 Participates as members of a team and contributes to group effort.
- C-10 Teaches others new skills.
- C-11 Serves Clients/Customers–works to satisfy customer’s expectations.
- C-12 Exercises Leadership–communicates ideas to justify position, persuades and convinces others, responsibly challenges existing procedures and policies.
- C-13 Negotiates–works toward agreements involving exchanges of resources; resolves divergent interests.
- C-14 Works With Diversity–works well with men and women from diverse backgrounds.

### **SYSTEMS–Understands Complex Interrelationships**

- C-15 Understands Systems–knows how social, organizational, and technological systems work and operates effectively with them.
- C-16 Monitors and Corrects Performance–distinguishes trends, predicts impacts on system operations, diagnoses systems performance and corrects malfunctions.
- C-17 Improves or Designs Systems–suggests modifications to existing systems and develops new or alternative systems to improve performance.

### **TECHNOLOGY–Works With a Variety of Technologies**

- C-18 Selects Technology–chooses procedures, tools, or equipment, including computers and related technologies.
- C-19 Applies Technology to Task–understands overall intent and proper procedures for setup and operation of equipment.
  - C-20 Maintains and Troubleshoots Equipment–prevents, identifies, or solves problems with equipment, including computers and other technologies.

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| <b>FOUNDATION SKILLS</b> |
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**BASIC SKILLS–Reads, Writes, Performs Arithmetic and Mathematical Operations, Listens and Speaks**

- F-1 Reading–locates, understands, and interprets written information in prose and in documents such as manuals, graphs, and schedules.
- F-2 Writing–communicates thoughts, ideas, information and messages in writing and creates documents such as letters, directions, manuals, reports, graphs, and flow charts.
- F-3 Arithmetic–performs basic computations; uses basic numerical concepts such as whole numbers, etc.
- F-4 Mathematics–approaches practical problems by choosing appropriately from a variety of mathematical techniques.
- F-5 Listening–receives, attends to, interprets, and responds to verbal messages and other cues.
- F-6 Speaking–organizes ideas and communicates orally.

**THINKING SKILLS–Thinks Creatively, Makes Decisions, Solves Problems, Visualizes and Knows How to Learn and Reason**

- F-7 Creative Thinking–generates new ideas.
- F-8 Decision-Making–specifies goals and constraints, generates alternatives, considers risks, evaluates and chooses best alternative.
- F-9 Problem Solving–recognizes problems, devises and implements plan of action.
- F-10 Seeing Things in the Mind’s Eye–organizes and processes symbols, pictures, graphs, objects, and other information.
- F-11 Knowing How to Learn–uses efficient learning techniques to acquire and apply new knowledge and skills.
- F-12 Reasoning–discovers a rule or principle underlying the relationship between two or more objects and applies it when solving a problem.

**PERSONAL QUALITIES–Displays Responsibility, Self-Esteem, Sociability, Self-Management, Integrity and Honesty**

- F-13 Responsibility–exerts a high level of effort and perseveres towards goal attainment.
- F-14 Self-Esteem–believes in own self-worth and maintains a positive view of self.
- F-15 Sociability–demonstrates understanding, friendliness, adaptability, empathy and polite-ness in group settings.
- F-16 Self-Management–assesses self accurately, sets personal goals, monitors progress and exhibits self-control.
- F-17 Integrity/Honesty–chooses ethical courses of action.