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Title 28 EDUCATION

Part XCIX. Bulletin 114—Trade and Industrial Education Content Standards Curriculum Framework—Automotive, Carpentry, and Welding

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Title 28 EDUCATION

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Subpart 1. General Provisions

Chapter 1. Purpose

§101. Introduction

A. The information contained in Subpart 1, General Provisions are applicable to Subpart 3-Automotive, Subpart 5-Carpentry, and Subpart 7-Welding.

B. The Secondary Trade and Industrial Education Program in the State of Louisiana can be described as "a secondary program designed to prepare students for careers in business, industry, and the service occupations through a sequence of applied learning experiences." Instructional units are provided in the use of layout, designing, producing, processing, assembling, testing, maintaining, and the servicing of industrial goods and products, as well as public services.

C. Intended Audience

1. The Louisiana Trade and Industrial Education curriculum framework is intended for a broad audience:

- a. trade and industrial education teachers;
- b. parents;
- c. school and district administrators;
- d. school board members;
- e. policy makers;
- f. Louisiana Department of Education staff;
- g. college/university faculty/administrators;
- h. business/industry leaders; and
- i. government agency staff.

2. The framework serves as a guide for curriculum and instruction and as a general reference to the concepts and skills taught within Louisiana Trade and Industrial Education courses. The intended users of the framework include:

a. Trade and Industrial Education teachers—to use in planning:

- i. curriculum;
- ii. instruction; and
- iii. assessment;

b. parents—to use as a means of assessing the effectiveness of their children's technology education;

c. school and district administrators and school board members—to use as a vision for technology education and a basis for planning:

- i. resource allocations;
- ii. materials purchases;
- iii. local curriculum development;
- iv. teachers' professional development; and
- v. faculty recruitment;

d. policy makers and state Education staff—to use as a basis for:

- i. developing laws, policies, professional development activities/materials, assessment strategies; and
- ii. funding priorities to support local program development;

e. university faculty and administrators—to use as a basis for the content and design of pre-service and in-service teacher education programs and articulation agreements;

f. technical college faculty and administrators—to use as a basis for articulation agreements and program development; and

g. business/industry leaders and government agency staff—to use as a basis for developing effective partnerships for supporting technology education programs and professional development.

D. How Teachers Should Use this Part XCIX. This Part XCIX outlines the content appropriate to be taught in Louisiana Trade and Industrial Education programs. Local needs will determine what should be taught in local trade and industrial education programs. Although teachers will be able to use this framework to guide them in the restructuring of their curricula, this Part XCIX does not contain specific performance criteria that are essential in technology education. These specific assessment criteria must be developed on the local level.

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§103. Definitions

Academic Cross-Reference—a reference to related academic content standards.

Applied Academics—a method of teaching in which the instructor presents subject matter in a way that relates a particular academic discipline to personal workforce application.

Approved Program—a program that offers at least four of the recommended courses for a career major—two of which must be at the competency level.

Articulation—the process of linking two or more educational systems to produce a smooth flow of students from one institution to another without experiencing delays, duplication of courses, or loss of credit.

Assessment—a process through which evidence is gathered in a range of content areas to determine both a student's understanding and ability to apply that understanding.

Benchmark—a broad statement of expected skills and knowledge that is used as a reference to develop curriculum and assess student progress.

Career Clusters—broad categories of occupations that form the basis for initial career exploration and discovery.

Career Major—a specific course of study within a broader career cluster.

1. Example. Accounting within the Business career cluster.

Career Path—a plan of study that will enable a student upon graduation, to be employed or enter a postsecondary school with a continuation of skills or coursework already started at the high school level.

Career Plan—a student's written plan for career and educational goals while in secondary school and beyond.

Competency Course—a required course in a career major.

Content Standard—a description of what a student should know and be able to do through subject matter, knowledge, proficiencies, etc., gained as a result of their education.

Cooperative Learning—an instructional strategy used in many applied academic courses that involves learning in the context of sharing, responding, and communicating with other learners.

Curriculum Framework—an outline of broad goals and standards of a system of education.

Focus Statement—a statement describing the importance of a career major.

Foundation Skills—processes that are common to all areas and levels of education and are intended to suggest methods and objectives of instructional strategies.

High Schools That Work—a process model developed by the Southern Regional Education Board (SREB) that focuses on:

1. applied learning;
2. integration of academic and vocational content; and

3. school-to-work transitions.

Integrated—refers to combining elements across the strands within a particular content area or framework.

Interdisciplinary—combining elements across content areas in the curriculum.

Lifelong Learning—the concept of continued education and training, formal and informal, throughout one's career.

Portfolios—personalized, sequential career planning journals designed to guide students through career development interests and aptitudes as they progress through school and beyond; including examples of student skill mastery.

Related Elective Course—an additional course offered to complement and enhance opportunities within a career major.

School-Based Learning—program of instruction based on career majors, designed to meet high academic and occupational skill standards, which involves counseling and career exploration, and periodic evaluation of academic strengths and weaknesses.

School-to-Work Transition—a system that enables students to identify and navigate paths to productive and progressively more rewarding roles in the workplace that encompasses three components:

1. school-based learning;
2. connecting activities; and
3. work-based learning.

Skill Standard—the identification of the knowledge, skill, and level of ability needed to satisfactorily perform a given job.

Strands—concepts common to all content areas. *Strands* are interrelated and should be integrated rather than taught in isolation.

Tech Prep—a sequence of study beginning in high school and continuing through at least two years of postsecondary occupational education to prepare students for high skilled jobs that require more than a high school diploma.

Vocational Completer—a student who successfully completes four courses in a career major:

1. two must be competency courses; and
2. two must be selected from the competency courses and/or identified related electives.

Work-Based Learning—integration of theoretical instruction with a planned program of job training or experiences, paid work experience, workplace mentoring, instruction in general workplace competencies, and updating elements that will:

1. engage student interest;
2. develop positive work attitudes; and
3. prepare youth for high-skill, high-wage careers.

Workplace Mentor—an employee at the workplace who possesses the skills to be mastered by a student, and who:

1. instructs the student;
2. critiques the student's performance;
3. challenges the student to perform well; and
4. works in consultation with classroom teachers and the employer.

AUTHORITY NOTE: Promulgated in accordance with R.S. 17:6(A)(10) and R.S. 17:10.

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§105. Mission Statement

A. To develop rigorous and challenging standards that will enable all Louisiana students to become lifelong learners and productive citizens for the twenty-first century.

B. This mission statement was developed by the Louisiana Statewide Content Standards Task Force in October 1995 and has served as the focus for the standards initiatives that have been developed by the Louisiana Department of Education. Along with this mission statement, the Task Force also identified five foundation skills that committee members felt should be embedded in all content areas to promote lifelong learning and to prepare Louisiana students to be successful in the next millennium.

C. The following five foundation skills serve as the backbone for the content standards initiative:

1. communication;
2. problem solving;
3. resource access and utilization;
4. linking and generating knowledge;
5. citizenship.

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§107. Foundation Skills

A. Foundation Skill 1: Communication

1. Exchanging of information
2. Creating and sharing meaning
3. Applying the skills of:
 - a. reading;
 - b. writing;
 - c. speaking;
 - d. listening;
 - e. viewing; and

f. visually representing in society and a variety of workplaces

B. Foundation Skill 2: Problem Solving

1. Recognizing and defining problems
2. Identifying an obstacle or challenge
3. Applying knowledge and thinking processes to reach a solution using multiple pathways
4. Showing willingness to take risks in order to learn
5. Persevering in the face of challenges and obstacles
6. Utilizing the five senses as a resource for problem solving
7. Analyzing past problems and applying basic knowledge to develop logical, creative, and practical strategies to predict, prevent, and solve problems
8. Identifying and considering a variety of viewpoints in solving problems
9. Developing, selecting, and applying strategies to solve existing and potential problems
10. Selecting and applying appropriate technology and other resources to solve problems
11. Verifying the appropriateness of the solution
12. Analyzing and evaluating the results or consequences

C. Foundation Skill 3: Resource Access and Utilization

1. Identifying, locating, selecting, and using resource tools in analyzing, synthesizing, and communicating information
2. Identifying, and employing appropriate tools, techniques, and technologies essential to the learning process, such as:
 - a. pen, pencil, and paper;
 - b. audio/video material;
 - c. word processors;
 - d. computer;
 - e. interactive devices;
 - f. telecommunications; and
 - g. other emerging technologies.

D. Foundation Skill 4: Linking and Generating Knowledge

1. Using cognitive processes to generate and link knowledge across the disciplines and in a variety of contexts
2. Applying a strategy or content knowledge effectively in a setting or context other than that in which it was originally learned
3. Monitoring, adjusting, and expanding strategies in other contexts

E. Foundation Skill 5: Citizenship

1. Understanding the ideals, rights, and responsibilities of active participation in a democratic republic

2. Working respectfully and productively together for the benefit of the individual and the community.

3. Being accountable for one's choices and actions and understanding their impact on others.

4. Knowing one's civil, constitutional, and statutory rights

5. Mentoring others to be productive citizens and lifelong learners

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Chapter 3. Louisiana Content Standards Foundation Skills

§301. Foundation Skills

NOTE: The foundation skills are listed numerically after each benchmark.

A. Communication—a process by which information is exchanged and a concept of *meaning* is created and shared between individuals through a common system of symbols, signs, or behavior. Students should be able to communicate clearly, fluently, strategically, technologically, critically, and creatively in society and in a variety of workplaces. This process can best be accomplished through the use of the following skills:

1. reading;
2. writing;
3. speaking;
4. listening;
5. viewing; and
6. visually representing.

B. Problem Solving—the identification of an obstacle or challenge and the subsequent application of knowledge and thinking processes, which include reasoning, decision making, and inquiry in order to reach a solution using multiple pathways, even when no routine path is apparent.

C. Resource Access and Utilization—the process of identifying, locating, selecting, and using resource tools to help in analyzing, synthesizing, and communicating information. The identification and employment of appropriate tools, techniques, and technologies are essential to all learning processes. These resource tools include:

1. pen, pencil, and paper;
2. audio/video materials;

3. word processors;
4. computers;
5. interactive devices;
6. telecommunication; and
7. other emerging technologies.

D. Linking and Generating Knowledge—the effective use of cognitive processes to generate and link knowledge across the disciplines and in a variety of contexts. In order to engage in the principles of continual improvement, students must be able to transfer and elaborate on these processes. *Transfer* refers to the ability to apply a strategy or content knowledge effectively in a setting or context other than that in which it was originally learned. *Elaboration* refers to monitoring, adjusting, and expanding strategies into other contexts.

E. Citizenship—the application of the understanding of the ideals, rights, and responsibilities of active participation in a democratic republic that includes working respectfully and productively together for:

1. the benefit of the individual and the community;
2. being accountable for one's civil, constitutional, and statutory rights; and
3. mentoring others to become productive citizens and lifelong learners.

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Chapter 5. Standards and Benchmarks

§501. Introduction

A. Standards and benchmarks provide a framework for local curriculum development. A school district's physical facilities, available equipment, resources, and community and business support are only a few of the factors that make the system unique and determine the curriculum offered.

B. In using this framework to develop curriculum, a *standard* is the major outcome of a course and *benchmarks* are the goals for obtaining that outcome. Local systems will select the career majors to be offered, the courses offered in these majors, and create the objectives and activities that teachers will use to direct their instruction to reach the benchmarks for the selected courses. This procedure will allow local systems to structure curriculum to meet the needs of their students, schools, and communities while remaining consistent with the overall framework for the entire state.

C. Local systems will use the career majors as a guide to select the courses that will be offered for each major. Not all career majors or all courses listed with the major in this framework must be offered locally. Employment

opportunities and postsecondary education availability in the local area should be considered as curriculum is developed.

D. To be identified as a vocational completer, a student must successfully complete four courses in a career major:

1. two of which *must be* competency courses; and
2. two of which must be selected from the competency courses and/or related elective courses identified in the career major.

E. Following each career major are the content standards that relate to the major. They identify what students should know and be able to do. In the column beside each standard are benchmarks that identify specific skills and knowledge and serve as points of reference to gauge student progress toward achievement of standards. Benchmarks set the direction of instruction.

F. Cross-references to academic content standards reinforce the integration of academic and technology skills. English Language Arts, Mathematics, Social Studies, and Science academic standards are cross-referenced in the third column beside each Technology Education standard. The referenced academic standards are listed in full in Chapter 7. Codes used in the table to identify the academic standards are given below.

1. ELA—English Language Arts
 - a. Standard number is given, then benchmark number
2. Mathematics
 - a. Strand letter is given, then benchmark number
 - N-Number and Number Relations Strand
 - A-Algebra Strand
 - M-Measurement Strand
 - G-Geometry Strand
 - D-Data, Discrete Math, and Probability Strand
 - P-Patterns, Relations, and Functions Strand
3. Social Studies
 - a. Strand letter is given, then benchmark letter and number
 - G-Geography Strand
 - C-Civics Strand
 - E-Economics Strand
 - H-History Strand
4. Science
 - a. Strand letter is given, then benchmark letter and number
 - SI-Science as Inquiry Strand
 - PS-Physical Science Strand
 - LS-Life Science Strand

SE-Science and the Environment Strand

5. Arts

- a. Strand letter is given, then benchmark letter and number

- CE-Creative Expression
- AP-Aesthetic Perception
- HP-Historical and Cultural Perception
- CA-Critical Analysis

AUTHORITY NOTE: Promulgated in accordance with R.S. 17:6(A)(10) and R.S. 17:10.

HISTORICAL NOTE: Promulgated by the Department of Education, Board of Elementary and Secondary Education, Trade and Industrial Education, LR 30:2749 (December 2004).

Chapter 7. Academic Cross-References

§701. Introduction

A. This Chapter lists the content standards and benchmarks that are referenced in Subpart 3, Automotive; Subpart 5, Carpentry; and Subpart 7, Welding. All referenced content area standards and benchmarks are for students in grades 9-12 (indicated as "H" for high school).

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§703. English Language Arts (ELA)

A. Standard One. Students read, comprehend, and respond to a range of materials, using a variety of strategies for different purposes.

ELA-1-H1	Using knowledge of word meaning and extending basic and technical vocabulary employing a variety of strategies (e.g., context clues, affixes, etymology, dictionary, thesaurus).
ELA-1-H2	Analyzing the effects of complex literary devices (e.g., figurative language, flashback, foreshadowing, dialogue, irony) and complex elements (e.g., setting, plot, character, theme, mood, style) on a selection.
ELA-1-H3	Reading, comprehending, and responding to extended, complex written, spoken, and visual texts.
ELA-1-H4	Interpreting complex texts with supportive explanations to generate connections to real-life situations and other texts (e.g., business, technical, scientific).
ELA-1-H5	Using the various purposes for reading (e.g., enjoying, learning, researching, problem-solving) to complete complex projects.

B. Standard Two. Students write competently for a variety of purposes and audiences.

ELA-2-H1	Writing a composition of complexity that clearly implies a central idea with supporting details in a logical, sequential order.
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ELA-2-H2	Using language, concepts, and ideas that show an awareness of the intended audience and/or purpose (e.g., classroom, real-life, workplace) in developing complex compositions.
ELA-2-H3	Applying the steps of the writing process, emphasizing revising and editing in final drafts.
ELA-2-H4	Using narration, description, exposition, and persuasion to develop various modes of writing (e.g., notes, stories, poems, letters, essays, editorials, critical analyses, logs).
ELA-2-H5	Recognizing and applying literary devices (e.g., figurative language, symbolism, dialogue) and various stylistic elements (e.g., diction, sentence structure, voice tone).
ELA-2-H6	Writing as a response to texts and life experiences (e.g., technical writing, résumés).

C. Standard Three. Students communicate using standard English grammar, usage, sentence structure, punctuation, capitalization, spelling, and handwriting.

ELA-3-H1	Writing legibly.
ELA-3-H2	Using the grammatical and mechanical conventions of standard English.
ELA-3-H3	Spelling accurately using strategies and resources (e.g., glossary, dictionary, thesaurus, spell check) when necessary.

D. Standard Four. Students demonstrate competence in speaking and listening as tools for learning and communicating.

ELA-4-H1	Speaking intelligibly, using standard English pronunciation and diction.
ELA-4-H2	Giving and following directions/procedures.
ELA-4-H3	Using the features of speaking (e.g., audience analysis, message construction, delivery, interpretation of feedback) when giving prepared and impromptu presentations.
ELA-4-H4	Speaking and listening for a variety of audiences (e.g., classroom, real-life, workplace) and purposes (e.g., awareness, concentration, enjoyment, information, problem solving).
ELA-4-H5	Listening and responding to a wide variety of media (e.g., music, TV, film, speech, CD-ROM).
ELA-4-H6	Participating in a variety of roles in group discussions (e.g., active listener, contributor, discussion leader, facilitator, recorder, mediator).

E. Standard Five. Students locate, select, and synthesize information from a variety of texts, media, references, and technological sources to acquire and communicate knowledge.

ELA-5-H1	Recognizing and using organizational features of printed text, other media, and electronic information (e.g., parts of texts, citations, endnotes, bibliographic references, microprint, laser discs, hypertext, CD-ROM, keyword searches, bulletin boards, e-mail).
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ELA-5-H2	Locating and evaluating information sources (e.g., print materials, databases, CD-ROM references, Internet information, electronic reference works, community and government data, television and radio resources, audio and visual materials).
ELA-5-H3	Accessing information and conducting research using graphic organizers, outlining, note taking, summarizing, interviewing, and surveying to produce documented texts and graphics.
ELA-5-H4	Using available technology to produce, revise, and publish a variety of works.
ELA-5-H5	Citing references using various formats (e.g., parenthetical citations, endnotes, bibliography).
ELA-5-H6	Interpreting graphic organizers (e.g., charts/graphs, tables/schedules, diagrams/maps, organizational charts/flowcharts).

F. Standard Six. Students read, analyze, and respond to literature as a record of life experiences.

ELA-6-H1	Identifying, analyzing, and responding to United States and world literature that represents the experiences and traditions of diverse ethnic groups.
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G. Standard Seven. Students apply reasoning and problem-solving skills to their reading, writing, speaking, listening, viewing, and visually representing.

ELA-7-H1	Using comprehension strategies (e.g., predicting, drawing conclusions, comparing and contrasting, making inferences, determining main ideas, summarizing, recognizing literary devices, paraphrasing) in contexts.
ELA-7-H2	Problem-solving by analyzing, prioritizing, categorizing, and evaluating; incorporating life experiences; and using available information.
ELA-7-H3	Analyzing the effects of an author's life, culture, and philosophical assumptions and an author's purpose and point of view.
ELA-7-H4	Distinguishing fact from opinion, skimming and scanning for facts, determining cause and effect, generating inquiry, and making connections with real-life situations across texts.

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§705. Mathematics

A. Number and Number Relations Strand (N). In problem-solving investigations, students demonstrate an understanding of the real number system and communicate the relationships within that system using a variety of techniques and tools.

N-1-H	Demonstrating an understanding of the real number system.
N-2-H	Demonstrating that a number can be expressed in many forms, and selecting an appropriate form

	for a given situation (e.g., fractions, decimals, percents, and scientific notation).
N-3-H	Using number sense to estimate and determine if solutions are reasonable.
N-4-H	Determining whether an exact or approximate answer is necessary.
N-5-H	Selecting and using appropriate computational methods and tools for given situations (e.g., estimation, or exact computation using mental arithmetic, calculator, symbolic manipulator, or paper and pencil).
N-6-H	Applying ratios and proportional thinking in a variety of situations (e.g., finding a missing term of a proportion).
N-7-H	Justifying reasonableness of solutions and verifying results.

B. Algebra Strand (A). In problem-solving investigations, students demonstrate an understanding of concepts and processes that allow them to analyze, represent, and describe relationships among variable quantities and to apply algebraic methods to real-world situations.

A-1-H	Demonstrating the ability to translate real-world situations (e.g., distance versus time relationships, population growth functions for diseases, growth of minimum wage, auto insurance tables) into algebraic expressions, equations, and inequalities and vice versa.
A-2-H	Recognizing the relationship between operations involving real numbers and operations involving algebraic expressions.
A-3-H	Using tables and graphs as tools to interpret algebraic expressions, equations, and inequalities.
A-4-H	Solving algebraic equations and inequalities using a variety of techniques with the appropriate tools (e.g., hand-held manipulatives, graphing calculator, symbolic manipulator, or pencil and paper).

C. Measurement Strand (M). In problem-solving investigations, students demonstrate an understanding of the concepts, processes, and real-life applications of measurements.

M-1-H	Selecting and using appropriate units, techniques, and tools to measure quantities in order to achieve specified degrees of precision, accuracy, and error (or tolerance) of measurements.
M-2-H	Demonstrating an intuitive sense of measurement (e.g., estimating and determining reasonableness of results as related to area, volume, mass, rate, and distance).

M-3-H	Estimating, computing, and applying physical measurement using suitable units (e.g., calculate perimeter and area of plane figures, surface area and volume of solids presented in real-world situations).
M-4-H	Demonstrating the concept of measurement as it applies to real-world experiences.

D. Geometry Strand (G). In problem-solving investigations, students demonstrate an understanding of geometric concepts and applications involving one-, two-, and three-dimensional geometry, and justify their findings.

G-1-H	Identifying, describing, comparing, constructing, and classifying geometric figures in two and three dimensions using technology where appropriate to explore and make conjectures about geometric concepts and figures.
G-2-H	Representing and solving problems using geometric models and the properties of those models (e.g., Pythagorean Theorem or formulas involving radius, diameter, and circumference).
G-3-H	Solving problems using coordinate methods, as well as synthetic and transformational methods (e.g., transform on a coordinate plane a design found in real-life situations).
G-4-H	Using inductive reasoning to predict, discover, and apply geometric properties and relationships (e.g., patty paper constructions, sum of the angles in a polygon).
G-5-H	Classifying figures in terms of congruence and similarity and applying these relationships.
G-6-H	Demonstrating deductive reasoning and mathematical justification (e.g., oral explanation, informal proof, and paragraph proof).

E. Data, Discrete Math, and Probability Strand (D). In problem-solving investigations, students discover trends, formulate conjectures regarding cause-and-effect relationships, and demonstrate critical thinking skills in order to make informed decisions.

D-3-H	Using simulations to estimate probabilities (e.g., lists and tree diagrams).
D-7-H	Making inferences from data that are organized in charts, tables, and graphs (e.g., pictograph; bar, line, or circle graph; stem-and-leaf plot or scatter plot).
D-8-H	Using logical thinking procedures, such as flow charts, Venn diagrams, and truth tables.
D-9-H	Using discrete math to model real-life situations (e.g., fair games or elections, map coloring).

F. Patterns, Relations, and Functions (P). In problem-solving investigations, students demonstrate understanding of patterns, relations, and functions that represent and explain real-world situations.

P-1-H	Modeling the concepts of variables, functions, and relations as they occur in the real world and using the appropriate notation and terminology.
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P-2-H	Translating between tabular, symbolic, or graphic representations of functions.
P-3-H	Recognizing behavior of families of elementary functions, such as polynomial, trigonometric, and exponential functions, and, where appropriate, using graphing technologies to represent them.
P-4-H	Analyzing the effects of changes in parameters (e.g., coefficients and constants).
P-5-H	Analyzing real-world relationships that can be modeled by elementary functions.

AUTHORITY NOTE: Promulgated in accordance with R.S. 17:6(A)(10) and R.S. 17:10.

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§707. Social Studies

A. Geography Strand: Physical and Cultural Systems (G). Students develop a spatial understanding of Earth's surface and the processes that shape it, the connections between people and places, and the relationship between man and his environment.

1. Benchmark A: The World in Spatial Terms

G-1A-H1	Using geographic representations, tools, and technologies to explain, analyze, and solve geographic problems.
G-1A-H2	Organizing geographic information and answering complex questions by formulating mental maps of places and regions.

2. Benchmark B: Places and Regions

G-1B-H1	Determining how location and social, cultural, and economic processes affect the features and significance of places.
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3. Benchmark C: Physical and Human Systems

G-1C-H1	Analyzing the ways in which Earth's dynamic and interactive physical processes affect different regions of the world.
G-1C-H2	Determining the economic, political, and social factors that contribute to human migration and settlement patterns and evaluating their impact on physical and human systems.

4. Benchmark D: Environment and Society

G-1D-H1	Describing and evaluating the ways in which technology has expanded the human capability to modify the physical environment.
G-1D-H2	Examining the challenges placed on human systems by the physical environment and formulating strategies to deal with these challenges.
G-1D-H3	Analyzing the relationship between natural resources and the exploration, colonization, settlement, and uses of land in different regions

	of the world.
G-1D-H4	Evaluating policies and programs related to the use of natural resources.
G-1D-H5	Developing plans to solve local and regional geographic problems related to contemporary issues.

B. Civics Strand: Citizenship and Government (C). Students develop an understanding of the structure and purposes of government, the foundations of the American democratic system, and the role of the United States in the world, while learning about the rights and responsibilities of citizenship.

1. Benchmark A: Structure and purposes of Government

C-1A-H1	Analyzing the necessity and purposes of politics and government and identifying examples of programs that fit within those purposes.
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C. Economics Strand: Interdependence and Decision Making (E). Students develop an understanding of fundamental economic concepts as they apply them to the interdependence and decision making of individuals, households, businesses, and governments in the United States and the world.

1. Benchmark A: Fundamental Economic Concepts

E-1A-H1	Analyzing the impact of the scarcity of productive resources and examining the choices and opportunity cost that result.
E-1A-H2	Analyzing the roles that production, distribution, and consumption play in economic decisions.
E-1A-H3	Applying the skills and knowledge necessary in making decisions about career options.
E-1A-H4	Comparing and evaluating economic systems.
E-1A-H5	Explaining the basic features of market structures and exchanges.
E-1A-H6	Analyzing the roles of economic institutions, such as corporations and labor unions, that compose economic systems.

2. Benchmark B: Individuals, Households, Businesses and Governments.

E-1B-H1	Identifying factors that cause changes in supply and demand.
E-1B-H2	Analyzing how changes in supply and demand, price, incentives, and profit influence production and distribution in a competitive market system.
E-1B-H3	Analyzing the impact of governmental taxation, spending, and regulation on different groups in a market economy.
E-1B-H4	Analyzing the causes and consequences of worldwide economic interdependence.

E-1B-H5	Evaluating the effects of domestic policies on international trade.
E-1B-H6	Analyzing Louisiana's role in the national and world economies.

3. Benchmark C: The Economy as a Whole

E-1C-H2	Explaining how interest rates, investments, and inflation/deflation impact the economy.
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D. History Strand: Time Continuity, and Change (H). Students develop a sense of historical time and historical perspective as they study the history of their community, state, nation, and world.

1. Benchmark A: Historical Thinking Skills

H-1A-H1	Applying key concepts, such as chronology and conflict, to explain and analyze patterns of historical change and continuity.
H-1A-H2	Explaining and analyzing events, ideas, and issues within a historical context.
H-1A-H3	Interpreting and evaluating the historical evidence presented in primary and secondary sources.
H-1A-H4	Utilizing knowledge of facts and concepts drawn from history and methods of historical inquiry to analyze historical and contemporary issues.
H-1A-H5	Conducting research in efforts to analyze historical questions and issues.
H-1A-H6	Analyzing cause-effect relationships.

2. Benchmark B: United States History

a. Era 6: The Development of the Industrial United States (1870-1900).

H-1B-H6	Analyzing the development of industrialization and examining its impact on American society.
H-1B-H6	Explaining the major changes that have resulted as the United States has moved from an industrial to an information society.
H-1B-H7	Analyzing developments and issues in contemporary American society.

3. Benchmark C: World History

a. Era 9: The Twentieth Century since 1945 (1945 to the present)

H-1C-H15	Explaining the worldwide significance of major political, economic, social, cultural, and technological developments and trends.
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§709. Science

A. Science as Inquiry Strand (SI). Students will *do* science by engaging in partial and full inquiries that are within their developmental capabilities.

1. Benchmark A: The Abilities Necessary to do Scientific Inquiry

SI-H-A1	Identifying questions and concepts that guide scientific investigations.
SI-H-A2	Designing and conducting scientific investigations.
SI-H-A3	Using technology and mathematics to improve investigations and communications.
SI-H-A4	Formulating and revising scientific explanations and models using logic and evidence.
SI-H-A5	Recognizing and analyzing alternative explanations and models.
SI-H-A6	Communicating and defending a scientific argument.
SI-H-A7	Utilizing science safety procedures during scientific investigations.

2. Benchmark B: Understanding Scientific Inquiry

SI-H-B2	Communicating that scientists conduct investigations for a variety of reasons, such as: exploration of new areas; discovery of new aspects of the natural world; confirmation of prior investigations; evaluation of current theories; and comparison of models and theories.
SI-H-B3	Communicating that scientists rely on technology to enhance the gathering and manipulation of data.
SI-H-B4	Analyzing a proposed explanation of scientific evidence according to the following criteria: follow a logical structure; follow rules of evidence; allow for questions and modifications based on historical and current scientific knowledge.
SI-H-B5	Communicating that the results of scientific inquiry, new knowledge, and methods emerge from different types of investigations and public communication among scientists.

B. Physical Science Strand (PS). Students will develop an understanding of the characteristics and interrelationships of matter and energy in the physical world.

1. Benchmark A: Atomic Structure

PS-H-B1	Describing the structure of the atom and identifying and characterizing the particles that compose it (including the structure and properties of isotopes).
PS-H-B2	Describing the nature and importance of radioactive isotopes and nuclear reactions (fission, fusion, radioactive decay).
PS-H-B3	Understanding that an atom's electron configuration, particularly that of the outermost electrons, determines the chemical properties of that atom.

2. Benchmark B: The Structure and Properties of Matter

PS-H-C1	Distinguishing among elements, compounds, and/or mixtures.
PS-H-C2	Discovering the patterns of physical and chemical properties found on the periodic table of the elements.
PS-H-C6	Recognizing that carbon atoms can bond to one another in chains, rings, and branching networks to form a variety of structures.
PS-H-C7	Using the kinetic theory to describe the behavior of atoms and molecules during the phase changes and to describe the behavior of matter in its different places.

3. Benchmark C: Chemical Reactions

PS-H-D1	Observing and describing changes in matter and citing evidence of chemical change.
PS-H-D6	Comparing and contrasting the energy changes that accompany changes in matter.
PS-H-D7	Identifying important chemical reactions that occur in living systems, the home, industry and the environment.

4. Benchmark D: Forces and Motion

PS-H-E1	Recognizing the characteristics and relative strengths of the forces of nature (gravitational, electrical, magnetic, nuclear).
PS-H-E2	Understanding the relationship of displacement, time, rate of motion, and rate of change of motion; representing rate and changes of motion mathematically and graphically.
PS-H-E3	Understanding effects of forces on changes in motion as explained by Newtonian mechanics.
PS-H-E4	Illustrating how frame of reference affects our ability to judge motion.

5. Benchmark E: Energy

PS-H-F1	Describing and representing relationships among energy, work, power, and efficiency.
PS-H-F2	Applying the universal law of conservation

	of matter, energy, and momentum, and recognizing their implications.
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6. Benchmark F: Interactions of Energy and Matter

PS-H-G1	Giving examples of the transport of energy through wave action.
PS-H-G2	Analyzing the relationship and interaction of magnetic and electrical fields and the forces they produce.
PS-H-G3	Characterizing and differentiating electromagnetic and mechanical waves and their effects on objects as well as humans.
PS-H-G4	Explaining the possible hazards of exposure to various forms and amounts of energy.

C. Earth Science Strand (ESS). Students will develop an understanding of the properties of Earth's materials, the structure of the Earth's system, the Earth's history, and the Earth's place in the universe.

[WARNING: Benchmarks for grades 9-12 need to be addressed if Earth Science is not offered at the high school level.]

1. Benchmark A: Energy in the Earth System

ESS-H-A1	Investigating the methods of energy transfer and identifying the sun as the major source of energy for most of the Earth's systems.
ESS-H-A2	Modeling the seasonal changes in the relative position and appearance of the sun and inferring the consequences with respect to the Earth's temperature.
ESS-H-A3	Explaining fission and fusion in relation to the Earth's internal and external heat sources.
ESS-H-A5	Demonstrating how the sun's radiant energy causes convection currents within the atmosphere and the oceans.

2. Benchmark B: Geochemical Cycles

ESS-H-B1	Illustrating how stable chemical atoms or elements are recycled through the solid earth, oceans, atmosphere, and organisms.
ESS-H-B2	Demonstrating Earth's internal and external energy sources as forces in moving chemical atoms or elements.

D. Science and the Environment Strand (SE). In learning environmental science, students will develop an appreciation of the natural environment, learn the importance of environmental quality, and acquire a sense of stewardship. As consumers and citizens, they will be able to recognize how our personal, professional, and political actions affect the natural world.

1. Benchmark A: Ecological Systems and Interactions

SE-H-A1	Demonstrating an understanding of the functions of Earth's major ecological systems.
SE-H-A2	Investigating the flow of energy in ecological systems.
SE-H-A9	Demonstrating an understanding of influencing factors of biodiversity.
SE-H-A10	Explaining that all species represent a vital link in a complex web of interaction.
SE-H-A11	Understanding how pollutants can affect living systems.

2. Benchmark B: Resources and Resource Management

SE-H-B1	Explaining the relationships between renewable and nonrenewable resources.
SE-H-B2	Comparing and contrasting conserving and preserving resources.
SE-H-B3	Recognizing that population size and geographic and economic factors result in the inequitable distribution of the Earth's resources.
SE-H-B4	Comparing and contrasting long and short-term consequences of resource management.
SE-H-B5	Analyzing resource management.
SE-H-B6	Recognizing that sustainable development is a process of change in which resource use, investment direction, technological development, and institutional change meet society's present as well as future needs.

3. Benchmark C: Environmental Awareness and Protection

SE-H-C1	Evaluating the dynamic interaction of land, water, and air and its relationship to living things in maintaining a healthy environment.
SE-H-C2	Evaluating the relationships between quality of life and environmental quality.
SE-H-C3	Investigating and communicating how environmental policy is formed by the interaction of social, economic, technological, and political considerations.
SE-H-C4	Demonstrating that environmental decisions include analyses that incorporate ecological, health, social, and economic factors.
SE-H-C5	Analyzing how public support affects the creation and enforcement of environmental laws and regulations.

4. Benchmark D: Personal Choices and Responsible Actions

SE-H-D1	Demonstrating the effects of personal choices and actions on the natural environment.
SE-H-D2	Analyzing how individuals are capable of reducing and reversing their impact on the environment through thinking, planning, education, collaboration, and action.
SE-H-D3	Demonstrating that the most important factor in prevention and control of pollution is education.
SE-H-D4	Demonstrating a knowledge that environmental issues should be a local and global concern.
SE-H-D5	Recognizing that the development of accountability toward the environment is essential for sustainability.
SE-H-D6	Developing an awareness of personal responsibility as stewards of the local and global environment.

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§711. Arts

A. Creative Expression (CE). Students develop creative expression through the application of knowledge, ideas, skills, and organizational abilities.

CE-1VA-H1	Producing works of art that successfully convey a central thought based on ideas, feelings, and memories.
CE-1VA-H2	Applying a variety of media techniques, technologies, and processes for visual expression and communication.
CE-1VA-H3	Recognizing and utilizing individual expression through the use of the elements of design while exploring compositional problems.
CE-1VA-H4	Producing a visual representation of ideas derived through the study of various cultures, disciplines, and art careers.
CE-1VA-H5	Producing imaginative works of art generated from individual and group ideas.

B. Aesthetic Perception (AP). Students develop aesthetic perception through the knowledge of art forms and respect for commonalities and differences.

AP-2VA-H1	Using an expanded art/design vocabulary when responding to the aesthetic qualities of a work of art.
AP-2VA-H2	Analyzing unique characteristics of art as it reflects the quality of everyday

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	life in various cultures.
AP-2VA-H3	Using descriptors, analogies, and other metaphors to describe interrelationships observed in works of art, nature, and the total environment.
AP-2VA-H4	Assimilating the multiple possibilities and options available for artistic expression.

C. Historical and Cultural Perception (HP). Students develop historical and cultural perception by recognizing and understanding that the arts throughout history are a record of human experience with a past, present, and future.

HP-3VA-H1	Categorizing specific styles and periods of art as they relate to various cultural, political, and economic conditions.
HP-3VA-H2	Analyzing how works of art cross geographical, political, and historical boundaries.
HP-3VA-H4	Analyzing materials, technologies, media, and processes of the visual arts throughout history.
HP-3VA-H5	Identifying the roles of artists who have achieved recognition and ways their works have influenced the community.

D. Critical Analysis (CA). Students will make informed judgments about the arts by developing critical analysis skills through study of and exposure to the arts.

CA-4VA-H1	Translating knowledge of the design elements and principles to communicate individual ideas.
CA-4VA-H2	Working individually/collectively to compare and contrast symbols and images in the visual arts within historical periods and in other core curricula.
CA-4VA-H3	Comparing and contrasting the processes, subjects, and media of the visual arts.
CA-4VA-H4	Analyzing how specific works are created and how they relate to cultures and to historical periods.

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Part XCIX. Bulletin 114—Trade and Industrial Education Content Standards Curriculum Framework—Automotive, Carpentry, and Welding

Subpart 3. Automotive

Chapter 13. Automobile Technical Training Certification Program

§1301. Introduction

A. See Subpart 1 of this Part XCIX for General Provisions applicable to this Automotive Program.

B. The Board of the National Institute for Automotive Service Excellence (ASE) is the responsible body for the Automobile Technical Training Certification Program. ASE will grant certification to programs that:

1. comply with the evaluation procedure;
2. meet established standards; and
3. adhere to the policies in this document.

C. The Certification Program is under the direct supervision of the Board of Trustees of the National Automotive Technicians Education Foundation (NATEF) and such personnel who are designated or employed by the Foundation.

D. The purpose of the Automobile Technician Training Certification Program is to improve the quality of training offered at the secondary and postsecondary levels. NATEF does not endorse specific curricular materials nor provide instruction to individuals, groups, or institutions. It does, however, set standards for the content of instruction which includes:

1. tasks;
2. tools and equipment;
3. hours; and
4. instructor qualifications.

E. The eight automobile areas that may be certified are:

1. brakes;
2. electrical/electronic systems;
3. engine performance;
4. suspension and steering;
5. automatic transmission and transaxle;
6. engine repair;
7. heating and air conditioning; and
8. manual drive train and axles.

F. Programs having difficulty in meeting certification requirements should consider the following options:

1. initiating an Articulation Agreement with another secondary or post-secondary training institution (see NATEF policies on articulation agreements).
2. borrowing equipment needed for instruction from a:
 - a. manufacturer,
 - b. dealership; or
 - c. independent repair shop.
3. arranging for instruction on tasks requiring equipment not available in the school program at a dealership or independent repair shop.

G. Programs choosing an option in Paragraph 2 or 3 above are required to show documentation on where the tasks are taught, by whom, and how students are evaluated.

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Chapter 15. Entry-Level Automotive Technology Secondary Program Rationale

§1501. Introduction

A. Automotive Service Excellence (ASE) voluntary certification is a means through which auto technicians can prove their abilities to themselves, to their employers, and to their customers. By passing ASE tests, instructors will earn the most valuable credentials available to auto repair technicians. Because the tests are tough, they have the satisfaction of knowing that they are among the elite in this profession. These credentials are recognized throughout the nation. Certified technicians promote customer trust and improve the image of the auto industry. Customer trust and professionalism are the first steps to a better and more prosperous business. ASE encourages individuals to take the tests and to join the proven pros who wear the ASE Blue Seal of Excellence.

B. There are eight tests in the ASE automobile certification test series. Four of these tests (A4 Suspension and Steering; A5 Brakes; A6 Electrical/Electronic Systems; A8 Engine Performance) correspond to the four basic areas of ASE certification for training instructors to be ASE-certified in the areas that they teach. ASE offers these tests at

the request of the Louisiana Department of Education to help facilitate schools' efforts to become or remain recognized by NATEF as an ASE-certified automotive training program.

C. ASE test questions are written by a panel of technical service experts from vehicle manufacturers, repair and test equipment and parts manufacturers, plus working technicians and educators. The questions are written to deal with practical problems of diagnosis and repair experienced by technicians in their day-to-day work. All questions are quality checked on a national sample of working technicians before they are used for score in an actual test.

D. ASE certification credentials are valid for five years. This assures that certified technicians are recognized as being up-to-date in the rapidly changing automotive service business. If it has been five years since a particular test has been taken, it is time to recertify. Certification may be renewed by passing the regular certification tests.

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§1503. 2001 Automobile Tests Specifications (including Content Areas and Number of Questions)

NOTE: Each regular test could contain up to 10 additional questions that are included for statistical research purposes only. Answers to these questions will not affect the test score. However, not knowing which ones they are, all questions in the test should be answered.

- A. A4 Suspension and Steering—40 questions
 - 1. Steering Systems Diagnosis and Repair – 10
 - a. Steering Columns and Manual Steering Gears (3)
 - b. Power-Assisted Steering Units (4)
 - c. Steering Linkage (3)
 - 2. Suspension Systems Diagnosis and Repair—13
 - a. Front Suspensions (6)
 - b. Rear Suspensions (5)
 - c. Miscellaneous Service (2)
 - 3. Wheel Alignment Diagnosis, Adjustment, and Repair—12
 - 4. Wheel and Tire Diagnosis and Repair—5
- B. A5 Brakes—55 questions
 - 1. Hydraulic System Diagnosis and Repair—14
 - a. Master Cylinder (non-ABS) (3)
 - b. Fluids, Lines, and Hoses (3)
 - c. Valves and Switches (non-ABS) (4)
 - d. Bleeding, Flushing, and Leak Testing (non-ABS) (4)
 - 2. Drum Brake Diagnosis and Repair—6

- 3. Disc Brake Diagnosis and Repair—13
- 4. Power Assist Units Diagnosis and Repair—4
- 5. Miscellaneous Systems Diagnosis and Repair—7
- 6. Anti-Lock Brake System (ABS) Diagnosis and Repair—11
- C. A6 Electrical/Electronic Systems—50 questions
 - 1. General Electrical/Electronic System Diagnosis—13
 - 2. Battery Diagnosis and Service—4
 - 3. Starting System Diagnosis and Repair—5
 - 4. Charging System Diagnosis and Repair—5
 - 5. Lighting Systems Diagnosis and Repair—6
 - a. Headlights, Parking Lights, Taillights, Dash Lights, and Courtesy Lights (3)
 - b. Stoplights, Turn Signals, Hazard Lights, and Backup Lights (3)
 - 6. Gauges, Warning Devices, and Driver Information Systems Diagnosis and Repair—6
 - 7. Horn and Wiper/Washer Diagnosis and Repair—3
 - 8. Accessories Diagnosis and Repair—8
 - a. Body (4)
 - b. Miscellaneous (4)
- D. A8 Engine Performance—65 questions
 - 1. General Engine Diagnosis—11
 - 2. Ignition System Diagnosis and Repair—11
 - 3. Fuel, Air Induction and Exhaust Systems Diagnosis and Repair—12
 - 4. Emissions Control systems Diagnosis and Repair (including OBD 11)—9
 - a. Positive Crankcase Ventilation (1)
 - b. Exhaust Gas Recirculation (3)
 - c. Secondary Air Injection (AIR) and Catalytic Converter (2)
 - d. Evaporative Emissions Controls (3)
 - 5. Computerized Engine Controls Diagnosis and Repair (including OBD 11)—18
 - 6. Engine Electrical Systems Diagnosis and Repair—4
 - a. Battery (1)
 - b. Starting System (1)
 - c. Charging System (2)

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Chapter 17. Industry-Based Certification Program Standards (Entry Level)

§1701. Introduction

A. Minimum Requirements. Each program must meet minimum requirements in order to become certified, as described in this §1701. The program must include laboratory/shop (co-op) experience and classroom instruction.

1. In many cases, programs may meet some requirements for certification through an articulation agreement with another institution.

B. Automobile Training Program (Per 1999 NATEF standards)

1. In order to have a program certified, ASE requires that each school offer instruction in at least four of the eight ASE specialty areas. The first four specialty areas indicated in the table below are required. The number of contact hours for each area (encompassing classroom instruction and shop time) is indicated under the Contact Hours heading.

Specialty Area	Contact Hours
Brakes	100
Electrical/Electronic Systems	200
Engine Performance	250
Suspension and Steering	100
Automatic Transmission and Transaxle	120
Engine Repair	120
Heating and Air Conditioning	90
Manual Drive Train and Axle	100

2. The NATEF task list is divided into three priority areas. The following guidelines must be followed.

a. 95 percent of all Priority 1 (P-1) items must be taught in the curriculum.

b. 80 percent of all Priority 2 (P-2) items must be taught in the curriculum.

c. 50 percent of all Priority 3 (P-3) items must be taught in the curriculum.

C. Components

1. Objectives. Each unit is based on objectives that state the measurable unit and specific behavioral or performance objectives that the student is expected to achieve. Since the objectives provide direction for the teaching-learning process, the teacher and student need a common understanding of the intent of the objectives.

2. Information Sheets. Presented in outline form, the information sheets provide content essential for meeting the objectives in each unit. The student should study the information sheets before class discussion or completion of the assignments sheets. The corresponding student reference page numbers appear in the upper right hand corner of the Instructor Guide.

3. Assignment Sheets. The assignment sheets allow the students to respond to cognitive questions in writing. The corresponding student workbook page numbers appear in the upper right hand corner of the Instructor Guide.

4. Job Sheets. The job sheets are designed to guide the student through various key tasks and provide a means for the instructor to evaluate performance of the task. The corresponding student workbook page numbers appear in the upper right hand corner of the Instructor Guide.

5. Unit Tests. The unit tests evaluate the student's knowledge of the material. The corresponding student test packet page numbers appear in the upper right hand corner of the Instructor Guide.

6. Student Workbook and Student Test Packet Tracking Sheet. The tracking sheets provide the instructor with an effective way to track student progress on the assignment sheets, job sheets, and unit tests.

7. Priority Item Crosswalk Chart. The priority item crosswalk chart cross-references the information sheets and job sheets to the NATEF task list. A listing of the required percentages of a P-1, P-2, or P-3 item covered by the curriculum is given.

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§1703. NATEF Program Standards

A. Standards 1 - 10

Standard 1	Purpose
Standard 1.1	Employment Potential
Standard 1.2	Program Description/Goals

Standard 2	Administration
Standard 2.1	Student Competency Certification
Standard 2.2	Chain of Command
Standard 2.3	Administrative Support
	A. Staff in-service
	B. Appropriate facilities
	C. Up-to-date tools and equipment
	D. Training support materials
Standard 2.4	Written Policies
Standard 2.5	Advisory Committees
Standard 2.6	Public/Community Relations
Standard 2.7	Live Work

Standard 3	Learning Resources
Standard 3.1	Service Information
Standard 3.2	Multimedia
Standard 3.3	Instructional Development Services

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Standard 3 Learning Resources	
Standard 3.4	Periodicals
Standard 3.5	Student Materials

Standard 4 Finances	
Standard 4.1	Program Training Costs
Standard 4.2	Budget
Standard 4.3	Budget Preparation
Standard 4.4	Status Reports

Standard 5 Student Services	
Standard 5.1	Pre-Testing
Standard 5.2	Pre-Admission Interviews
Standard 5.3	Student Records
Standard 5.4	Placement
Standard 5.5	Follow-up
Standard 5.6	Legal Requirements

Standard 6 Instruction	
Standard 6.1	Program Plan
Standard 6.2	Student Training Plan
Standard 6.3	Preparation Time
Standard 6.4	Teaching Load
Standard 6.5	Curriculum
Standard 6.6	Student Progress
Standard 6.7	Performance Standards
Standard 6.8	Safety Standards
Standard 6.9	Personal Characteristics
Standard 6.10	Work Habits/Ethics
Standard 6.11	Provisions for Individual Differences
Standard 6.12	Related Instruction
Standard 6.13	Testing
Standard 6.14	Evaluation of Instruction
Standard 6.15	Live Work
Standard 6.16	Articulation

Standard 7 Equipment	
Standard 7.1	Safety
Standard 7.2	Type and Quality
Standard 7.3	Consumable Supplies
Standard 7.4	Maintenance
Standard 7.5	Replacement
Standard 7.6	Inventory
Standard 7.7	Parts Purchasing
Standard 7.8	Hand Tools

Standard 8 Facilities	
Standard 8.1	Training Stations
Standard 8.2	Safety
Standard 8.3	Maintenance
Standard 8.4	Housekeeping
Standard 8.5	Office Space
Standard 8.6	Instructional Area
Standard 8.7	Storage
Standard 8.8	Support Facilities
Standard 8.9	Ventilation
Standard 8.10	First Aid
Standard 8.11	Facility Evaluation

Standard 9 Instructional Staff	
Standard 9.1	Technical Competency
Standard 9.2	Instructional Competency/Certification
Standard 9.3	Technical Updating
Standard 9.4	First Aid
Standard 9.5	Substitutes

Standard 10 Cooperative Agreements	
Standard 10.1	Standards
Standard 10.2	Agreements
Standard 10.3	Supervision

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Chapter 19. Course Standards

§1901. Introduction to Automotive Technology

Benchmarks	NATEF Task(S)	Louisiana Foundation Skills	Academic Cross-Reference (Standard-Benchmark)
A. SAFETY			English Language Arts
(1) Identify the safe use of chemicals.	NONE	1,3,5	ELA 1 – H1, H3, H4, H5
(2) Identify the safe use of hand tools.	NONE	1,2,3	ELA 2 – H1, H2, H3, H4, H5, H6
(3) Identify the safe use of power tools.	NONE	1,3,5	ELA 3 – H1, H2, H3
(4) Identify the safe use of protective clothing and equipment.	NONE	1,2	ELA 4 – H1, H2, H3, H4, H5, H6
(5) Identify the safe use of fire protection equipment.	NONE	1,2	ELA 5 – H1, H2, H3, H4, H5, H6
(6) Identify the safe use of shop equipment.	NONE	1,2	ELA 7 – H1, H2
(7) Follow Environmental Protection Agency (EPA) and Occupational Safety and Health Act (OSHA) regulations.	NONE	1,2	Mathematics N - 1H, 2H, 3H, 4H, 5H, 6H, 7H D - 7H, 9H A - 1H, 2H, 3H, 4H M - 1H, 2H, 3H, 4H G - 1H, 2H, 3H, 4H, 5H, 6H
B. SHOP OPERATION			Social Studies
(1) Communicate with customers and write repair orders.	NONE	1,2,3	G - 1A-H1, 1A-H2, 1D-H1, 1D-H2, 1D-H4, 1D-H5
(2) Estimate time and cost for a job and order parts.	NONE	1,2,3	E - 1A-H1, 1A-H2, 1A-H3, 1A-H5, 1B-H1, 1B-H2, 1B-H4, 1B-H5, 1B-H6
(3) Obtain appropriate repair information from service manuals.	NONE	1,2	H - 1A-H1, 1A-H2, 1A-H5, 1A-H6
(4) Practice clean and orderly work habits (vehicle, tools, and work area.)	NONE	1,2	Science SI-H – A1, A2, A3, A4, A5, A6, A7, B3, B4, B5 PS-H – C1, C2, D1, D6, D7, E1, E2, E3, E4, F1, F2, G1, G2, G3, G4
C. COMPONENTS AND CAREERS			
(1) Identify basic function and operation of vehicle mechanical components.	NONE	1,2	ESS-H – A1, A2, A3, A5, A6, B1, B2, D7 SE-H – A1, A2, A11, B1, B2, B3, B4, B5, B6, C1, C2, C3, C4, C5, D1, D2, D3, D4, D5, D6
(2) Identify automotive technology career opportunities and the duties of a technician.	NONE	1,2	

AUTHORITY NOTE: Promulgated in accordance with R.S. 17:6(A)(10) and R.S. 17:10.

HISTORICAL NOTE: Promulgated by the Department of Education, Board of Elementary and Secondary Education, Trade and Industrial Education, LR 30:2759 (December 2004).

EDUCATION

§1903. Electrical Systems

Benchmarks	NATEF Task(S)	Louisiana Foundation Skills	Academic Cross-Reference (Standard-Benchmark)
<p>D. GENERAL ELECTRICAL SYSTEMS DIAGNOSIS</p> <p>(1) Check continuity in electrical circuits using test light and voltmeter, oscilloscope, and wiring diagram.</p> <p>(2) Check for shorts, opens, and grounds.</p> <p>(3) Measure resistance in electrical circuits using an ohmmeter.</p> <p>(4) Measure volts with a voltmeter or oscilloscope.</p> <p>(5) Measure current with an ammeter.</p>	<p>VI-A-1 thru 4; VI-A-8; VI-A-9 VI-A-1 thru 3; VI-A-6 thru 10 VI-A-5; VI-A-8 thru 10 VI-A-3; VI-A-8 thru 10 VI-A-4; VI-A-8</p>	<p>1, 3, 5 2, 3 3, 4 2, 3, 4 2, 3, 4</p>	<p>English Language Arts ELA 1 – H1, H3, H4, H5 ELA 2 – H1, H2, H3, H4, H5, H6 ELA 3 – H1, H2, H3 ELA 4 – H1, H2, H3, H4, H5, H6 ELA 5 – H1, H2, H3, H4, H5, H6 ELA 7 – H1, H2</p> <p>Mathematics N – 1H, 2H, 3H, 4H, 5H, 6H, 7H D – 7H, 9H A – 1H, 2H, 3H, 4H M – 1H, 2H, 3H, 4H G – 1H, 2H, 3H, 4H, 5H, 6H</p> <p>Social Studies G – 1A-H1, 1A-H2, 1D-H1, 1D-H2, 1D-H4, 1D-H5 E – 1A-H1, 1A-H2, 1A-H3, 1A-H5, 1B-H1, 1B-H2, 1B-H4, 1B-H5, 1B-H6 H – 1A-H1, 1A-H2, 1A-H5, 1A-H6</p> <p>Science SI-H – A1, A2, A3, A4, A5, A6, A7, B3, B4, B5 PS-H – C1, C2, D1, D6, D7, E1, E2, E3, E4, F1, F2, G1, G2, G3, G4 ESS-H – A1, A2, A3, A5, A6, A7, B1, B2, D7 SE-H – A1, A2, A11, B1, B2, B3, B4, B5, B6, C1, C2, C3, C4, C5, D1, D2, D3, D4, D5, D6</p>
<p>E. BATTERY DIAGNOSIS AND SERVICE</p> <p>(1) Clean and inspect battery clamps, cables, and connectors.</p> <p>(2) Perform battery condition tests.</p> <p>(3) Jump start a vehicle.</p> <p>(4) Charge and install a battery.</p>	<p>VI-B-3; VI-B-6 VI-B-1; VI-B-2; VI-B-4 VI-B-7 VI-B-4; VI-B-5</p>	<p>1, 3, 5 2, 3 3, 4 2, 3, 4</p>	
<p>F. STARTING SYSTEM DIAGNOSIS AND REPAIR</p> <p>(1) Diagnose starting system and determine necessary action.</p> <p>(2) Remove, clean, and inspect starter motor and components.</p> <p>(3) Repair or replace starter motor components.</p>	<p>VI-C-1 thru 4 VI-C-5; VI-C-6 VI-C-7</p>	<p>2, 3, 4 2, 3, 4 2, 3, 4</p>	

Benchmarks	NATEF Task(S)	Louisiana Foundation Skills	Academic Cross-Reference (Standard-Benchmark)
<p>G. CHARGING SYSTEM DIAGNOSIS AND REPAIR</p> <p>(1) Diagnose charging system and determine necessary action.</p> <p>(2) Remove, clean, and inspect generator (alternator).</p> <p>(3) Repair or replace generator (alternator) components.</p> <p>(4) Repair or replace charging system components.</p>	<p>VI-D-1 thru 4; VI-D-7 VI-D-5; VI-D-6 VI-D-5; VI-D-6 VI-D-3; VI-D-4</p>	<p>1, 3, 5 2, 3 3, 4 2, 3, 4</p>	
<p>H. LIGHTING SYSTEM DIAGNOSIS AND REPAIR</p> <p>(1) Diagnose lighting system problems and determine necessary action.</p> <p>(2) Repair or replace lights, sockets, wires, and switches.</p>	<p>V-E-6; VI-E-1; VI-E-3 VI-A-11; VI-A-12 VI-E-2; VI-E-3</p>	<p>2, 3, 4 2, 3, 4</p>	
<p>I. GAUGES AND ELECTRICAL ACCESSORIES</p> <p>(1) Diagnose and repair gauge and warning circuits.</p> <p>(2) Diagnose and repair electrical accessories (horn, wiper, windshield washer, motor-driven accessory circuits, heated glass, electric lock, cruise control system, supplemental restraint system, radio).</p>	<p>I-D-12; V-E-5; VI-F-1 thru 4 VI-A-11; VI-A-12 VI-G-1 thru 3; VI-H-1 thru 6</p>	<p>1, 3, 5 2, 3</p>	

AUTHORITY NOTE: Promulgated in accordance with R.S. 17:6(A)(10) and R.S. 17:10.

HISTORICAL NOTE: Promulgated by the Department of Education, Board of Elementary and Secondary Education, Trade and Industrial Education, LR 30:2760 (December 2004).

§1905. Engine Performance

Benchmarks	NATEF Task(S)	Louisiana Foundation Skills	Academic Cross-Reference (Standard-Benchmark)
<p>J. IGNITION SYSTEMS</p> <p>(1) Conduct engine performance tests using engine analyzer and determine necessary action.</p> <p>(2) Inspect, repair, or replace primary ignition components.</p> <p>(3) Inspect, repair, or replace secondary ignition components.</p> <p>(4) Adjust ignition system to manufacturer's specifications..</p> <p>(5) Perform on-board computer system diagnosis.</p> <p>(6) Repair or replace computer system components.</p>	<p>VIII-A-1 thru 10; VIII-B-1 thru 6;VIII-B-11; VIII-C-1;VIII-C-2 VIII-C-3; VIII-C-4; VIII-C-6 thru 9 VIII-B-7; VIII-C-4 thru 6</p> <p>VIII-B-7; VIII-C-7</p> <p>VIII-B-1 thru 5 VIII-B-5; VIII-B-7 thru 10</p>	<p>1, 3, 5</p> <p>2, 3</p> <p>3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p>	<p>English Language Arts</p> <p>ELA 1 – H1, H3, H4, H5 ELA 2 – H1, H2, H3, H4, H5, H6 ELA 3 – H1, H2, H3 ELA 4 – H1, H2, H3, H4, H5, H6 ELA 5 – H1, H2, H3, H4, H5, H6 ELA 7 – H1, H2</p> <p>Mathematics</p> <p>N – 1H, 2H, 3H, 4H, 5H, 6H, 7H D – 7H, 9H A – 1H, 2H, 3H, 4H M – 1H, 2H, 3H, 4H G – 1H, 2H, 3H, 4H, 5H, 6H</p> <p>Social Studies</p> <p>G – 1A-H1, 1A-H2 1D-H1, 1D-H2, 1D-H4, 1D-H5 E – 1A-H1, 1A-H2, 1A-H3, 1A-H5, 1B-H1, 1B-H2, 1B-H4, 1B-H5, 1B-H6 H – 1A-H1, 1A-H2, 1A-H5, 1A-H6</p> <p>Science</p> <p>SI-H – A1, A2, A3, A4, A5, A6, A7, B3, B4, B5 PS-H – C1, C2, D1, D6, D7, E1, E2, E3, E4, F1, F2, G1, G2, G3, G4 ESS-H – A1, A2, A3, A5, A6, A7, B1, B2, D7 SE-H – A1,A2, A11, B1, B2, B3, B4, B5, B6, C1, C2, C3, C4, C5, D1, D2, D3, D4, D5, D6</p>
<p>K. FUEL AND EXHAUST SYSTEMS</p> <p>(1) Diagnose fuel system problems and determine necessary action.</p> <p>(2) Inspect, repair, or replace fuel supply components.</p> <p>(3) Disassemble, clean, and inspect carburetors.</p> <p>(4) Reassemble and adjust carburetors.</p> <p>(5) Disassemble, clean, and inspect fuel injection components</p> <p>(6) Repair or replace fuel injection components</p> <p>(7) Adjust computer-controlled fuel systems (injection and carburetor).</p> <p>(8) Diagnose and repair exhaust system problems.</p>	<p>VIII-B-1; VIII-B-2;VIII-B-7 thru 10;VIII-D-1 thru 4 VIII-B-7; VIII-D-3; VIII-D-5; VIII-D-6 VIII-B-7; VIII-D-8 VIII-D-14 VIII-B-7; VIII-D-6;VIII-D-8; VIII-D-12 thru 14 VIII-B-7;VIII-D-7 thru 11; VIII-D-14;VIII-B-7; VIII-D-7 thru 11; VIII-D-14 VIII-B-7 VIII-D-9 thru 13</p> <p>VIII-D-15 thru 17</p>	<p>1, 3, 5</p> <p>2, 3</p> <p>3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p>	<p>Science</p> <p>SI-H – A1, A2, A3, A4, A5, A6, A7, B3, B4, B5 PS-H – C1, C2, D1, D6, D7, E1, E2, E3, E4, F1, F2, G1, G2, G3, G4 ESS-H – A1, A2, A3, A5, A6, A7, B1, B2, D7 SE-H – A1,A2, A11, B1, B2, B3, B4, B5, B6, C1, C2, C3, C4, C5, D1, D2, D3, D4, D5, D6</p>
<p>L. EMISSION CONTROL SYSTEMS</p> <p>(1) Diagnose emission control systems and determine necessary action.</p> <p>(2) Clean, inspect, and replace Positive Crankcase Ventilation (PCV) system components.</p> <p>(3) Clean, inspect, and replace spark timing controllers.</p> <p>(4) Clean, inspect, and replace idle speed controllers.</p> <p>(5) Clean, inspect, and replace exhaust gas recirculation.</p> <p>(6) Clean, inspect, and replace air management system.</p> <p>(7) Clean, inspect, and replace inlet air temperature control.</p> <p>(8) Clean, inspect, and replace intake manifold heat controls.</p> <p>(9) Clean, inspect, and replace fuel vapor controls.</p>	<p>VIII-D-1; VIII-D-2;VIII-E-1-1;VIII-E-2-1;VIII-E-3-1;VIII-E-2-1; VIII-E-5-1;VIII-E-6-1</p> <p>VIII-E-1-2</p> <p>VIII-E-3-2</p> <p>VIII-D-12; VIII-D-13</p> <p>VIII-D-2-2 thru 2-4</p> <p>VIII-E-3-2 thru 3-4</p> <p>VIII-E-4-2</p> <p>VIII-E-4-2</p> <p>VIII-3-5-2;VIII-E-6-2</p>	<p>2, 3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p>	

EDUCATION

Benchmarks	NATEF Task(S)	Louisiana Foundation Skills	Academic Cross-Reference (Standard-Benchmark)
J. IGNITION SYSTEMS (1) Conduct engine performance tests using engine analyzer and determine necessary action. (2) Inspect, repair, or replace primary ignition components. (3) Inspect, repair, or replace secondary ignition components. (4) Adjust ignition system to manufacturer's specifications.. (5) Perform on-board computer system diagnosis. (6) Repair or replace computer system components.	VIII-A-1 thru 10; VIII-B-1 thru 6;VIII-B-11; VIII-C-1;VIII-C-2 VIII-C-3; VIII-C-4; VIII-C-6 thru 9 VIII-B-7; VIII-C-4 thru 6 VIII-B-7; VIII-C-7 VIII-B-1 thru 5 VIII-B-5; VIII-B-7 thru 10	1, 3, 5 2, 3 3, 4 2, 3, 4 2, 3, 4 2, 3, 4	English Language Arts ELA 1 – H1, H3, H4, H5 ELA 2 – H1, H2, H3, H4, H5, H6 ELA 3 – H1, H2, H3 ELA 4 – H1, H2, H3, H4, H5, H6 ELA 5 – H1, H2, H3, H4, H5, H6 ELA 7 – H1, H2 Mathematics N – 1H, 2H, 3H, 4H, 5H, 6H, 7H D – 7H, 9H A – 1H, 2H, 3H, 4H M – 1H, 2H, 3H, 4H G – 1H, 2H, 3H, 4H, 5H, 6H Social Studies G – 1A-H1, 1A-H2 1D-H1, 1D-H2, 1D-H4, 1D-H5 E – 1A-H1, 1A-H2, 1A-H3, 1A-H5, 1B-H1, 1B-H2, 1B-H4, 1B-H5, 1B-H6 H – 1A-H1, 1A-H2, 1A-H5, 1A-H6 Science SI-H – A1, A2, A3, A4, A5, A6, A7, B3, B4, B5 PS-H – C1, C2, D1, D6, D7, E1, E2, E3, E4, F1, F2, G1, G2, G3, G4 ESS-H – A1, A2, A3, A5, A6, A7, B1, B2, D7 SE-H – A1,A2, A11, B1, B2, B3, B4, B5, B6, C1, C2, C3, C4, C5, D1, D2, D3, D4, D5, D6
K. FUEL AND EXHAUST SYSTEMS (1) Diagnose fuel system problems and determine necessary action. (2) Inspect, repair, or replace fuel supply components. (3) Disassemble, clean, and inspect carburetors. (4) Reassemble and adjust carburetors. (5) Disassemble, clean, and inspect fuel injection components (6) Repair or replace fuel injection components (7) Adjust computer-controlled fuel systems (injection and carburetor). (8) Diagnose and repair exhaust system problems.	VIII-B-1; VIII-B-2;VIII-B-7 thru 10;VIII-D-1 thru 4 VIII-B-7; VIII-D-3; VIII-D-5; VIII-D-6 VIII-B-7; VIII-D-8 VIII-D-14 VIII-B-7; VIII-D-6;VIII-D-8; VIII-D-12 thru 14 VIII-B-7;VIII-D-7 thru 11; VIII-D-14;VIII-B-7; VIII-D-7 thru 11; VIII-D-14 VIII-B-7 VIII-D-9 thru 13 VIII-D-15 thru 17	1, 3, 5 2, 3 3, 4 2, 3, 4 2, 3, 4 2, 3, 4 2, 3, 4 2, 3, 4	Science SI-H – A1, A2, A3, A4, A5, A6, A7, B3, B4, B5 PS-H – C1, C2, D1, D6, D7, E1, E2, E3, E4, F1, F2, G1, G2, G3, G4 ESS-H – A1, A2, A3, A5, A6, A7, B1, B2, D7 SE-H – A1,A2, A11, B1, B2, B3, B4, B5, B6, C1, C2, C3, C4, C5, D1, D2, D3, D4, D5, D6
L. EMISSION CONTROL SYSTEMS (1) Diagnose emission control systems and determine necessary action. (2) Clean, inspect, and replace Positive Crankcase Ventilation (PCV) system components. (3) Clean, inspect, and replace spark timing controllers. (4) Clean, inspect, and replace idle speed controllers. (5) Clean, inspect, and replace exhaust gas recirculation. (6) Clean, inspect, and replace air management system. (7) Clean, inspect, and replace inlet air temperature control. (8) Clean, inspect, and replace intake manifold heat controls. (9) Clean, inspect, and replace fuel vapor controls.	VIII-D-1; VIII-D-2;VIII-E-1-1;VIII-E-2-1;VIII-E-3-1;VIII-E-2-1; VIII-E-5-1;VIII-E-6-1 VIII-E-1-2 VIII-E-3-2 VIII-D-12; VIII-D-13 VIII-D-2-2 thru 2-4 VIII-E-3-2 thru 3-4 VIII-E-4-2 VIII-E-4-2 VIII-E-3-5-2;VIII-E-6-2	2, 3, 4 2, 3, 4 2, 3, 4 2, 3, 4 2, 3, 4 2, 3, 4 2, 3, 4 2, 3, 4	

AUTHORITY NOTE: Promulgated in accordance with R.S. 17:6(A)(10) and R.S. 17:10.

HISTORICAL NOTE: Promulgated by the Department of Education, Board of Elementary and Secondary Education, Trade and Industrial Education, LR 30:2761 (December 2004).

§1907. Steering and Suspension Systems

Benchmarks	NATEF Task(S)	Louisiana Foundation Skills	Academic Cross-Reference (Standard-Benchmark)
R. STEERING SYSTEMS			English Language Arts
(1) Diagnose steering systems and determine necessary action.	IV-A-3 thru 6; IV-A-14; IV-A-21	1, 3, 5	ELA 1 – H1, H3, H4, H5 ELA 2 – H1, H2, H3, H4, H5, H6 ELA-3 – H1, H2, H3
(2) Clean and inspect power and manual steering gear boxes.	IV-A-4	2, 3	ELA 4 – H1, H2, H3, H4, H5, H6 ELA 5 – H1, H2, H3, H4, H5, H6 ELA 7 – H1, H2
(3) Reassemble, adjust, and install power and manual steering gear boxes.	IV-A-7; IV-A-12	3, 4	Mathematics
(4) Clean and inspect power and manual rack-and-pinion steering rack.	IV-A-8; IV-A-9 IV-A-12	2, 3, 4	N – 1H, 2H, 3H, 4H, 5H, 6H, 7H D – 7H, 9H A – 1H, 2H, 3H, 4H M – 1H, 2H, 3H, 4H G – 1H, 2H, 3H, 4H, 5H, 6H
(5) Reassemble, adjust, and install power and manual rack-and pinion steering rack.	IV-A-9 thru 11	2, 3, 4	Social Studies
(6) Inspect and repair steering columns.	IV-A-1 thru 3; IV-A-6	2, 3	G – 1A-H1, 1A-H2, 1D-H1, 1D-H2, 1D-H4, 1D-H5 E – 1A-H1, 1A-H2, 1A-H3, 1A-H5, 1B-H1, 1B-H2, 1B-H4, 1B-H5, 1B-H6 H – 1A-H1, 1A-H2, 1A-H5, 1A-H6
(7) Inspect and replace steering linkage components.	IV-A-19 thru 21	2, 3, 4	Science
(8) Inspect, repair, and replace power steering pumps.	IV-A-12 thru 18	2, 3, 4	SI-H – A1, A2, A3, A4, A5, A6, A7, B3, B4, B5 PS-H – C1, C2, D1, D6, D7, E1, E2, E3, E4, F1, F2, G1, G2, G3, G4 ESS-H – 1A, A2, A3, A5, A6, A7, B1, B2, D7 SE-H – A1, A2, A11, B1, B2, B3, B4, B5, B6, C1, C2, C3, C4, C5, D1, D2, D3, D4, D5, D6
S. DIAGNOSE AND REPAIR FRONT SUSPENSION SYSTEMS			
(1) Diagnose conventional and electronic front suspension systems and determine necessary action.	IV-B-1-1; IV-B-1-2; IV-B-3-1; IV-B-3—3	1, 3, 5	
(2) Inspect and repair control arm and spring assemblies on conventional systems.	IV-B-1-3; IV-B-1—9; IV-B-1-11	2, 3	
(3) Inspect and repair wheel spindles and bearings.	IV-B-3-2	3, 4	
(4) Inspect and replace shock absorbers and stabilizer bars.	IV-B-1-9; IV-B-3-1	2, 3, 4	
(5) Diagnose MacPherson strut assemblies and determine necessary action.	IV-B-1-2	2, 3, 4	
(6) Clean, inspect, and assemble MacPherson strut assemblies	IV-B-1-10	2, 3, 4	
T. DIAGNOSE AND REPAIR REAR SUSPENSION SYSTEMS			
(1) Diagnose conventional and electronic rear suspension systems and determine necessary action.	IV-B-2-1 thru 2-4; IV-B-3-1 thru 3-3	2, 3	
(2) Inspect and replace shock and spring assemblies.	IV-B-2-1; IV-B-2-3; IV-B-3-1	2, 3, 4	
(3) Inspect and replace MacPherson strut assemblies.	IV-B-2-4; IV-B-3-3	2, 3, 4	
(4) Inspect and repair suspension linkages and bushings.	IV-B-2-2; IV-B-2-3	2, 3, 4	
U. TIRE AND WHEEL ALIGNMENT DIAGNOSIS AND REPAIR			
(1) Diagnose steering and tire wear problems and determine necessary action.	IV-B-1-1; IV-B-1-2; IV-B-2-3; IV-C-1; IV-D-1 thru 3; IV-D-5; IV-D-6	2, 3	
(2) Set correct alignment angles on front wheels.	IV-C-2 thru 9; IV-C-12, IV-C-13	2, 3	
(3) Set correct camber and toe on rear wheels.	IV-C-2 thru 5; IV-C-10; IV-C-11	2, 3	
(4) Rotate and balance tire and wheel assemblies.	IV-D-1 thru 5; IV-D-7 thru 9	2, 3	

AUTHORITY NOTE: Promulgated in accordance with R.S. 17:6(A)(10) and R.S. 17:10.

HISTORICAL NOTE: Promulgated by the Department of Education, Board of Elementary and Secondary Education, Trade and Industrial Education, LR 30:2763 (December 2004).

EDUCATION

§1909. Brakes

Benchmarks	NATEF Task(S)	Louisiana Foundation Skills	Academic Cross-Reference (Standard-Benchmark)
<p>V. DIAGNOSE AND REPAIR HYDRAULIC SYSTEMS</p> <p>(1) Diagnose hydraulic brake systems and determine necessary action.</p> <p>(2) Inspect and repair or replace master cylinders and lines of the hydraulic system.</p> <p>(3) Inspect and replace switches and valving devices.</p>	<p>V-A-4</p> <p>V-A-1 thru 3; V-A-5 thru 7; V-A-11; V-A-12</p> <p>V-A-8 thru 12</p>	<p>2, 3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p>	<p>English Language Arts</p> <p>ELA 1 – H1, H3, H4, H5</p> <p>ELA 2 – H1, H2, H3, H4, H5, H6</p> <p>ELA 3 – H1, H2, H3</p> <p>ELA 4 – H1, H2, H3, H4, H5, H6</p> <p>ELA 5 – H1, H2, H3, H4, H5, H6</p> <p>ELA 7 – H1, H2</p> <p>Mathematics</p> <p>N – 1H, 2H, 3H, 4H, 5H, 6H, 7H</p> <p>D – 7H, 9H</p> <p>A – 1H, 2H, 3H, 4H</p> <p>M – 1H, 2H, 3H, 4H</p> <p>G – 1H, 2H, 3H, 4H, 5H, 6H</p> <p>Social Studies</p> <p>G – 1A-H1, 1A-H2, 1D-H1, 1D-H2, 1D-H4, 1D-H5</p> <p>E – 1A-H1, 1A-H2, 1A-H3, 1A-H5, 1B-H1, 1B-H2, 1B-H4, 1B-H5, 1B-H6</p> <p>H – 1A-H1, 1A-H2, 1A-H5, 1A-H6</p> <p>Science</p> <p>S1-H – A1, A2, A3, A4, A5, A6, A7, B3, B4, B5</p> <p>PS-H – C1, C2, D1, D6, D7, EE1, E2, E3, E4, F1, F2, G1, G2, G3, G4</p> <p>ESS-H- A1, A2, A3, A5, A6, A7, B1, B2, D7</p> <p>SE-H – A1, A2, A11, B1, B2, B3, B4, B5, B6, C1, C2, C3, C4, C5, D1, D2, D3, D4, D5, D6</p>
<p>W. DIAGNOSE AND REPAIR DRUM BRAKES</p> <p>(1) Diagnose drum brake systems and determine necessary action.</p> <p>(2) Remove, clean, and inspect drum brake assemblies.</p> <p>(3) Repair, replace, and adjust drum brake components.</p>	<p>V-B-1; V-E-1</p> <p>V-E-4 thru 6</p> <p>V-B-2 thru 5; V-E-2 thru 4</p> <p>V-B-5 thru 7; V-3-2; V-E-4; V-E-6; V-E-7</p>	<p>2, 3</p> <p>2, 3</p> <p>2, 3</p>	
<p>X. DIAGNOSE AND REPAIR DISC BRAKES</p> <p>(1) Diagnose disc brake systems and determine necessary action.</p> <p>(2) Remove, clean, and inspect disc brake assemblies.</p> <p>(3) Repair, replace, and adjust disc brake components</p>	<p>V-C-1</p> <p>V-C-2 thru 5; V-C-7; V-C-11; V-E-2 thru 5; V-C-6; V-C-8 thru 11; V-E-2 thru 4; V-E-6; V-E-7</p>	<p>2, 3</p> <p>2, 3</p> <p>2, 3</p>	
<p>Y. DIAGNOSE AND REPAIR POWER ASSIST BRAKES</p> <p>(1) Diagnose and determine necessary action on power assist brakes.</p> <p>(2) Repair or replace power brake components.</p> <p>(3) Repair or replace hydro-boost components.</p> <p>(4) Check operation of anti-lock braking systems: adjust or repair.</p>	<p>V-A-1; V-A-4; V-D-1 thru 4</p> <p>V-D-1 thru 3</p> <p>V-D-4</p> <p>V-F-1 thru 8</p>	<p>2, 3, 4</p> <p>2, 3</p> <p>2, 3</p> <p>2, 3</p>	

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Title 28 EDUCATION

Part XCIX. Bulletin 114—Trade and Industrial Education Content Standards Curriculum Framework—Automotive, Carpentry, and Welding

Subpart 5. Carpentry

Chapter 33. Carpentry Training Certification

§3301. Introduction

A. Refer to Subpart 1 of this Part XCIX for General Provisions applicable to this Carpentry Program.

B. The carpentry-level one materials were developed by the National Center for Construction Education and Research (NCCER) in response to the training needs of the construction and maintenance industries. It is one of many in the NCCER's standardized craft training program. The program, covering more than 30 craft areas and including all major construction skills, was developed over a period of years by industry and education specialists. Sixteen of the largest construction and maintenance firms in the United States committed financial and human resources to the teams that wrote the curricula and planned the nationally-accredited training process. These materials are industry-proven and consist of competency-based textbooks and instructor's guides.

C. The NCCER is a not-for-profit educational entity affiliated with the University of Florida and supported by the following industry and craft associations:

1. American Fire Sprinkler Association
2. American Welding Society
3. Associated General Contractors of America
4. Carolinas AGC, Inc.
5. Carolinas Electrical Contractors Association
6. Construction Industry Institute
7. Design-Build Institute of America
8. Metal Building Manufacturers Association
9. National Association of State Supervisors for Trade and Industrial Education
10. National Insulation Association
11. National Utility Contractors Association
12. North American Crane Bureau
13. Portland Cement Association
14. Steel Erectors Association of America
15. U.S. Army Corps of Engineers
16. Women Construction Owners and Executives, USA

17. American Society for Training and Development
18. Associated Builders and Contractors, Inc.
19. Association for Career and Technical Education
20. Citizen's Democracy Corps
21. Construction Users Roundtable
22. Merit Contractors Association of Canada
23. National Association of Minority Contractors
24. National Association of Women in Construction
25. National Ready Mixed Concrete Association
26. National Vocational Technical Honor Society
27. Painting and Decorating Contractors of America
28. Skills USA-VICA
29. Texas Gulf Coast Chapter ABC
30. University of Florida

D. Some of the features of the NCCER's standardized craft training program include:

1. a proven record of success over many years of use by industry companies;
2. national standardization providing portability of learned job skills and educational credits that will be of tremendous value to trainees;
3. recognition. Upon successful completion of training with an accredited sponsor, trainees receive an industry-recognized certificate and transcript from the NCCER;
4. compliance with Apprenticeship, Training, Employer and Labor Services (ATELS) requirements (formerly BAT) for related classroom training (CFR 29:29);
5. well-illustrated, up-to-date, and practical information.

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Chapter 35. Level-One Carpentry Secondary Program Rationale

§3501. Introduction

A. This course introduces the carpentry trainee to the carpentry trade, including the apprenticeship process and the opportunities within the trade.

B. Learning Objectives. Upon completion of this course, the trainee will be able to:

1. describe the history of the carpentry trade;
2. identify the stages of progress within the carpentry trade;
3. identify the responsibilities of a person working in the construction industry;
4. state the personal characteristics of a professional;
5. explain the importance of safety in the construction industry.

C. National Center for Construction Education and Research Standardized Craft Training Program

1. The National Center for Construction Education and Research (NCCER) provides a standardized national program of accredited craft training. Key features of the program include instructor certification, competency-based training, and performance testing. The program provides trainees, instructors, and companies with a standard form of recognition through a National Craft Training Registry. The program is described in full in the *Guidelines for Accreditation*, published by the NCCER. For more information on standardized craft training, contact the NCCER at P. O. Box 141104, Gainesville, FL 32614-1104, 352-334-0911, visit the Web site at www.NCCER.org, or e-mail info @NCCER.org.

D. How to Use the Annotated Instructor's Guide

1. Each page presents two sections of information. The larger section displays each page exactly as it appears in the Trainee Module. The narrow column ties suggested trainee and instructor actions to each page and provides icons which calls attention to material, safety, audiovisual, or testing requirements. The bottom of each page includes space for taking notes.

2. Teaching Tip. If the Teaching Tip icon appears, it is indicating that there is a teaching tip associated with the section. Also refer to any suggested teaching tips at the end of the module.

E. Safety Considerations. Ensure that the trainees are equipped with appropriate personal protective equipment.

F. Preparation. Before teaching this module, the Module Outline, the Learning Objectives, and the Materials and Equipment List should be reviewed. Ample time should be allowed for preparation of personal training or lesson plans and to gather all required equipment and materials.

G. Materials and Equipment List

1. Materials
 - a. Transparencies
 - b. Markers/Chalk
 - c. Module Examinations (located in the test booklet packaged with Annotated Instructor's Guide)
 - d. Exploring Careers in Construction (optional)
 - e. Videotape (optional), *Careers in Construction: Carpentry*
2. Equipment
 - a. Overhead projector and screen
 - b. Whiteboard/chalkboard
 - c. Appropriate personal protective equipment
 - d. Television and videocassette recorder (optional)

H. Additional Resources

1. This module is intended to present thorough resources for task training. The reference in Subparagraph a below is suggested for both instructors and motivated trainees interested in further study. This is optional material for continued education rather than for task training.

a. *Careers in Construction: Carpentry*, videotape. Gainesville, FL: The National Center for Construction Education and Research.

I. Teaching Time for This Module

1. An outline for use in developing a lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2 1/2 hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 2 1/2 hours are suggested to cover *Orientation to the Trade*. The time required for hands-on activity and testing will need adjusting based on class size and resources.

TOPIC	PLANNED TIME
Session I. Orientation to the Trade	
A. Introduction	
B. History of Carpentry	
C. Modern Carpentry	
D. Opportunities in the Construction Industry	
1. Formal Construction Training	
2. Apprenticeship Program	
a. Youth Apprenticeship Program	
b. Apprenticeship Standards	
3. Responsibilities of the Employee	
a. Professionalism	
b. Honesty	
c. Loyalty	
d. Willingness to Learn	
e. Willingness to Take Responsibility	
f. Willingness to Cooperate	
g. Rules and Regulations	
h. Tardiness and Absenteeism	
4. What to Expect from Your Employer	
5. What to Expect from a Training Program	

6. What to Expect from the Apprenticeship Comm.
- E. Human Relations
1. Making Human Relations Work
 2. Human Relations and Productivity
 3. Attitude
 4. Maintaining a Positive Attitude
- F. Employer and Employee Safety Obligations
- G. Summary
1. Summarize module
 2. Answer questions
- H. Module Examination
1. Trainees must score 70 percent or higher to receive recognition from the NCCER.
 2. Record the testing results on Craft Training Report Form 200 and submit the results to the training program sponsor.

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Chapter 37. Industry-Based Certification Program Standards

§3701. Competencies/Objectives—Level One

- A. Module 27101—Orientation to the Trade
1. Describe the history of the carpentry trade.
 2. Identify the stages of progress within the carpentry trade.
 3. Identify the responsibilities of a person working in the construction industry.
 4. State the personal characteristics of a professional.
 5. Explain the importance of safety in the construction industry.
- B. Module 27102—Wood Building Materials, Fasteners, and Adhesives
1. Explain the terms commonly used in discussing wood and lumber.
 2. State the uses of various types of hardwoods and softwoods.
 3. Identify various types of imperfections that are found in lumber.
 4. Explain how lumber is graded.
 5. Interpret grade markings on lumber and plywood.
 6. Explain how plywood is manufactured, graded, and used.
 7. Identify various types of building boards and identify their uses.
 8. Identify the uses of and safety precautions associated with pressure-treated lumber.
 9. Describe the proper method of caring for lumber and wood building materials at the job site.

10. State the uses of various types of engineered lumber.
11. Calculate the quantities of lumber and wood products using industry-standard methods.
12. List the basic nail and staple types and their uses.
13. List the basic types of screws and their uses.
14. Identify the different types of anchors and their uses.
15. Describe the common types of adhesives used in construction work and explain their uses.

C. Module 27103—Hand and Power Tools

1. Identify the hand tools commonly used by carpenters and describe their uses.
2. Use hand tools in a safe and appropriate manner.
3. State the general safety rules for operating all power tools, regardless of type.
4. State the general rules for properly maintaining all power tools, regardless of type.
5. Identify the portable power tools commonly used by carpenters and describe their uses.
6. Use portable power tools in a safe and appropriate manner.
7. Identify the stationary power tools commonly used by carpenters and describe their uses.
8. Use stationary power tools in a safe and appropriate manner.

D. Module 27104—Floor Systems

1. Identify the different types of framing systems.
2. Read and understand drawings and specifications to determine floor system requirements.
3. Identify floor and sill framing and support members.
4. Name the methods used to fasten sills to the foundation.
5. Given specific floor load and span data, select the proper girder/beam size from a list of available girders/beams.
6. List and recognize different types of floor joists.
7. Given specific floor load and span data, select the proper joist size from a list of available joists.
8. List and recognize different types of bridging.
9. List and recognize different types of flooring materials.
10. Explain the purposes of subflooring and underlayment.
11. Match selected fasteners used in floor framing to their correct uses.

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12. Estimate the amount of material needed to frame a floor assembly.

13. Demonstrate the ability to:

- a. lay out and construct a floor assembly;
- b. install bridging;
- c. install joists for a cantilever floor;
- d. install a subfloor using butt-joining plywood/OSB panels
- e. install a single floor system using tongue-and-groove plywood/OSB panels.

E. Module 27105—Wall and Ceiling Framing

1. Identify the components of a wall and ceiling layout.

2. Describe the procedure for laying out a wood frame wall, including:

- a. plates;
- b. corner posts;
- c. door and window openings;
- d. partition T's;
- e. bracing; and
- f. firestops.

3. Describe the correct procedure for assembling and erecting an exterior wall.

4. Describe the common materials and methods used for installing sheathing on walls.

5. Lay out, assemble, erect, and brace exterior walls for a frame building.

6. Describe wall framing techniques used in masonry construction.

7. Explain the use of metal studs in wall framing.

8. Describe the correct procedure for laying out a ceiling.

9. Cut and install ceiling joists on a wood frame building.

10. Estimate the materials required to frame walls and ceilings.

F. Module 27106—Roof Framing

1. Understand the terms associated with roof framing.

2. Identify the roof framing members used in gable and hip roofs.

3. Identify the methods used to calculate the length of a rafter.

4. Identify the various types of trusses used in roof framing.

5. Use a rafter framing square, speed square, and calculator in laying out a roof.

6. Identify various types of sheathing used in roof construction.

7. Frame a gable roof with vent openings.

8. Frame a roof opening.

9. Construct a frame roof, including:

- a. hips;
- b. valleys;
- c. commons;
- d. jack rafters; and
- e. sheathing.

10. Erect a gable roof using trusses.

11. Estimate the materials used in framing and sheathing a roof.

G. Module 27107—Windows and Exterior Doors

1. Identify various types of fixed, sliding, and swinging windows.

2. Identify the parts of a window installation.

3. State the requirements for a proper window installation.

4. Install a pre-hung window.

5. Identify the common types of skylights and roof windows.

6. Describe the procedure for properly installing a skylight.

7. Identify the common types of exterior doors and explain how they are constructed.

8. Identify the parts of a door installation.

9. Identify the types of thresholds used with exterior doors.

10. Install a threshold on a concrete floor.

11. Install a pre-hung exterior door with weatherstripping.

12. Identify the various types of locksets used on exterior doors and explain how they are installed.

13. Explain the correct installation procedure for a rollup garage door.

14. Install a lockset.

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Chapter 39. Course Standards

§3901. Entry Level Carpentry Training

Benchmarks	Louisiana Foundation Skills	Academic Cross-Reference (Standard-Benchmark)
<p>A. Orientation to the Trade</p> <p>(1) Describe the history of the carpentry trade.</p> <p>(2) Identify the stages of progress within the carpentry trade.</p> <p>(3) Identify the responsibilities of a person working in the industry.</p> <p>(4) State the personal characteristics of a professional.*</p> <p>(5) Explain the importance of safety in the construction industry.</p> <p>* The professional is working for the benefit of the individual and the community within the confines of the local and state building codes.</p>	<p>1, 3, 5</p> <p>1, 2, 3</p> <p>1, 3, 5</p> <p>1, 2, 5</p> <p>1, 2</p>	<p>English Language Arts</p> <p>ELA 1 – H1, H3, H4, H5</p> <p>ELA 2 – H1, H2, H3, H4, H5, H6</p> <p>ELA 3 – H1, H2, H3</p> <p>ELA 4 – H1, H2, H3, H4, H5, H6</p> <p>ELA 5 – H1, H2, H3, H4, H5, H6</p> <p>ELA 7 – H1, H2</p> <p>Mathematics</p> <p>N – 1H, 2H, 3H, 4H, 5H, 6H, 7H</p> <p>D – 7H, 9H</p> <p>A – 1H, 2H, 3H, 4H</p> <p>M – 1H, 2H, 3H, 4H</p> <p>G – 1H, 2H, 3H, 4H, 5H, 6H</p> <p>Social Studies</p> <p>G – 1A-H1, 1A-H2, 1D-H1, 1D-H2, 1D-H4, 1D-H5</p> <p>E – 1A-H1, 1A-H2, 1A-H3, 1A-H5, 1B-H1, 1B-H2, 1B-H4, 1B-H5, 1B-H6, H – 1A-H1, 1A-H2, 1A-H5, 1A-H6</p> <p>Science</p> <p>SI-H – A1, A2, A3, A4, A5, A6, A7, B3, B4, B5</p> <p>PS-H – C1, C2, D1, D6, D7, E1, E2, E3, E4, F1, F2, G1, G2, G3, G4</p> <p>ESS-H – A1, A2, A3, A5, A6, A7, B1, B2, D7</p> <p>SE-H – A1, A2, A11, B1, B2, B3, B4, B5, B6, C1, C2, C3, C4, C5, D1, D2, D3, D4, D5, D6</p>

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§3903. Carpentry Competencies and Objectives

Benchmarks	Louisiana Foundation Skills	Academic Cross-Reference (Standard-Benchmark)
<p>A. WOOD BUILDING MATERIALS, FASTENERS, AND ADHESIVES</p> <p>(1) Explain the terms commonly used in discussing wood and lumber</p> <p>(2) State the uses of various types of hardwoods and softwoods.</p> <p>(3) Identify various types of imperfections that are found in lumber.</p> <p>(4) Explain how lumber is graded.</p> <p>(5) Interpret grade markings on lumber and plywood.</p> <p>(6) Explain how plywood is manufactured, graded, and used.</p> <p>(7) Identify various types of building boards and identify their uses.</p> <p>(8) Identify the uses of and safety precautions associated with pressure-treated lumber.</p> <p>(9) Describe the proper method of caring for lumber and wood building materials at the job site.</p> <p>(10) State the uses of various types of engineered lumber.</p> <p>(11) Calculate the quantities of lumber and wood products using industry-standard methods.</p> <p>(12) List the basic nail and staple types and their uses.</p> <p>(13) List the basic types of screws and their uses.</p> <p>(14) Identify the different types of anchors and their uses.</p>	<p>1, 3</p> <p>1, 2, 3</p> <p>1, 3, 4</p> <p>1, 2, 3, 4</p> <p>2, 3, 4</p> <p>1, 2, 3, 4</p> <p>1, 2, 3, 4</p> <p>1, 3, 5</p> <p>1, 2, 3</p> <p>1, 3, 4</p> <p>2, 3, 4</p> <p>1, 2, 3, 4</p> <p>1, 2, 3, 4</p> <p>1, 2, 3, 4</p>	<p>English Language Arts</p> <p>ELA 1 – H1, H3, H4, H5</p> <p>ELA 2 – H1, H2, H3, H4, H5, H6</p> <p>ELA 3 – H1, H2, H3</p> <p>ELA 4 – H1, H2, H3, H4, H5, H6</p> <p>ELA 5 – H1, H2, H3, H4, H5, H6</p> <p>ELA 7 – H1, H2</p> <p>Mathematics</p> <p>N – 1H, 2H, 3H, 4H, 5H, 6H, 7H</p> <p>D – 7H, 9H</p> <p>A – 1H, 2H, 3H, 4H</p> <p>M – 1H, 2H, 3H, 4H</p> <p>G – 1H, 2H, 3H, 4H, 5H, 6H</p> <p>Social Studies</p> <p>G – 1A-H1, 1A-H2, 1D-H1, 1D-H2, 1D-H4, 1D-H5</p> <p>E – 1A-H1, 1A-H2, 1A-H3, 1A-H5, 1B-H1, 1B-H2, 1B-H4, 1B-H5, 1B-H6</p> <p>H – 1A-H1, 1A-H2, 1A-H5, 1A-H6</p> <p>Science</p> <p>SI-H – A1, A2, A3, A4, A5, A6, A7, B3, B4, B5</p> <p>PS-H- C1, C2, D1, D6, D7, E1, E2, E3, E4,</p>

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Benchmarks	Louisiana Foundation Skills	Academic Cross-Reference (Standard-Benchmark)
(15) Describe the common types of adhesives used in construction work and explain their uses.	1, 2, 3, 4	F1, F2, G1, G2, G3, G4 ESS-H- A1, A2, A3, A5, A6, A7, B1, B2, D7 SE-H – A1, A2, A11, B1, B2, B3, B4, B5, B6, C1, C2, C3, C4, C5, D1, D2, D3, D4, D5, D6
B. HAND AND POWER TOOLS		
(1) Identify the hand tools commonly used by carpenters and describe their uses.	1, 3	
(2) Use hand tools in a safe and appropriate manner.	2, 3	
(3) State the general safety rules for operating all power tools, regardless of type.	1, 3, 4	
(4) State the general rules for properly maintaining all power tools, regardless of type.	1, 2, 3, 4	
(5) Identify the portable power tools commonly used by carpenters and describe their uses.	1, 2, 3, 4	
(6) Use portable power tools in a safe and appropriate manner.	2, 3, 4	
(7) Identify the stationary power tools commonly used by carpenters and describe their uses.	1, 3, 5	
(8) Use stationary power tools in a safe and appropriate manner.	2, 3	
C. FLOOR SYSTEMS		
(1) Identify the different types of framing systems.	1, 3, 4	
(2) Read and understand drawings and specifications to determine floor system requirements.	1, 2, 3, 4	
(3) Identify floor and sill framing and support members.	1, 2, 3, 4	
(4) Name the methods used to fasten sills to the foundation.	1, 2, 3, 4	
(5) Given specific floor load and span data, select the proper girder/beam size from a list of available girders/beams.	2, 3, 4	
(6) List and recognize different types of floor joists.	1, 2, 3, 4	
(7) Given specific floor load and span data, select the proper joist size from a list of available joists.	1, 3, 5	
(8) List and recognize different types of bridging.	1, 2, 3	
(9) List and recognize different types of flooring materials.	3, 4	
(10) Explain the purposes of subflooring and underlayment.	1, 2, 3, 4	

Benchmarks	Louisiana Foundation Skills	Academic Cross-Reference (Standard-Benchmark)
C. FLOOR SYSTEMS (continued)		
(11) Match selected fasteners used in floor framing to their correct uses.		
(12) Estimate the amount of material needed to frame a floor assembly.	2, 3, 4	
(13) Demonstrate the ability to: lay out and construct a floor assembly; install bridging; install joists for cantilever floor install a subfloor using butt-joint plywood; install a single floor system.	2, 3, 4 2, 3, 4	
D. WALL AND CEILING FRAMING		
(1) Identify the components of a wall and ceiling layout.	1, 2, 3, 4	
(2) Describe the procedure for laying out a wood frame wall, including plates, corner posts, door and window openings, partition T's bracing, and firestops.	1, 3, 5	
(3) Describe the correct procedure for assembling and erecting an exterior wall.	1, 2, 3	
(4) Describe the common materials and methods used for installing sheathing on walls.	1, 3, 4	
(5) Lay out, assemble, erect, and brace exterior walls for a frame building.	2, 3, 4	
(6) Describe wall framing techniques used in masonry construction.	1, 2, 3, 4	
(7) Explain the use of metal studs in wall framing.	1, 2, 3, 4	

Benchmarks	Louisiana Foundation Skills	Academic Cross-Reference (Standard-Benchmark)
<p>(8) Describe the correct procedure for laying out a ceiling. (9) Cut and install ceiling joists on a wood frame building. (10) Estimate the materials required to frame walls and ceilings.</p> <p>E. ROOF FRAMING</p> <p>(1) Understand the terms associated with roof framing. (2) Identify the roof framing members used in gable and hip roofs. (3) Identify the methods used to calculate the length of a rafter. (4) Identify the various types of trusses used in roof framing. (5) Use a rafter framing squire, speed square, and calculator in laying a roof. (6) Identify various types of sheathing used in roof construction. (7) Frame a gable roof with vent openings. (8) Frame a roof opening. (9) Construct a frame roof, including hips, valleys, commons, jack rafters, and sheathing. (10) Erect a gable roof using trusses. (11) Estimate the materials used in framing and sheathing a roof.</p>	<p>1, 2, 3, 4 2, 3, 4 2, 3, 4 1, 3, 5 1, 2, 3 1, 3, 4 1, 2, 3, 4 2, 3, 4 1, 2, 3, 4 2, 3, 4 2, 3, 4 2, 3, 4 2, 3, 4 2, 3, 4</p>	
<p>F. WINDOWS AND EXTERIOR DOORS</p> <p>(1) Identify various types of fixed, sliding, and swinging windows. (2) Identify the parts of a window installation. (3) State the requirements for a proper window installation. (4) Install a pre-hung window. (5) Identify the common types of skylights and roof windows. (6) Describe the procedure for properly installing a skylight. (7) Identify the common types of exterior doors and explain how they are constructed. (8) Identify the parts of a door installation. (9) Identify the types of thresholds used with exterior doors. (10) Install a threshold on a concrete floor. (11) Install a pre-hung exterior door with weatherstripping. (12) Identify the various types of locksets used on exterior doors and explain how they are installed. (13) Explain the correct installation procedure for a rollup garage door. (14) Install a lockset.</p>	<p>1, 2, 3, 4 1, 2, 3, 4 1, 2, 3, 4 2, 3, 4 1, 2, 3, 4 1, 2, 3, 4 1, 2, 3, 4 1, 2, 3, 4 2, 3, 4 2, 3, 4 1, 2, 3, 4 1, 2, 3, 4 2, 3, 4</p>	

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Title 28 EDUCATION

Part XCIX. Bulletin 114—Trade and Industrial Education Content Standards Curriculum Framework—Automotive, Carpentry, and Welding

Subpart 7. Welding

Chapter 55. Entry-Level Welding

§5501. Introduction

A. Refer to Subpart 1 of this Part XCIX for General Provisions applicable to this Welding Program.

B.. *Entry-Level Welder*—an individual employed in this position is considered to possess the prerequisite knowledge, attitude, skills, and abilities required to perform procedures that involve routine, predictable, repetitive, proceduralized tasks involving motor skills and limited theoretical knowledge while working under close supervision.

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§5503. Entry-Level Welder Occupational Description

A. Common work assignments:

1. follows detailed verbal or written instructions given by an immediate supervisor to set up and carry out specific job assignments;

2. performs general housekeeping duties to maintain workspace, equipment, and tool cleanliness;

3. fills out, maintains, and submits a time or work assignment card, record, or report as required by the employer's or institution's internal policy;

4. follows safety regulations in the performance of daily duties.

B. Drawing and welding symbol interpretation:

1. prepares parts from simple sketches or drawings;

2. performs welding operations; and

3. prepares welded joints from welding symbol information.

C. Arc welding:

1. sets up shielded metal arc welding operations, for all position fillet and groove welding within a limited thickness range of plain carbon steel material;

2. sets up gas metal arc welding (short circuit transfer) operations, for all position fillet and groove welding within a limited thickness range of plain carbon steel;

3. sets up gas metal arc welding (spray transfer) operations for limited position and material thickness range on plain carbon steel;

4. sets up flux cored arc welding operations for all positions, fillet, and groove welding within a limited thickness range of plain carbon steel material;

5. performs gas tungsten arc welding operations on aluminum and stainless steel within a limited position, limited material thickness range;

6. performs minor external repairs to equipment and accessories.

D. Oxyfuel gas cutting:

1. sets up and performs manual oxyfuel gas cutting operations that include straight and shape cutting, beveling, and weld removal (weld washing);

2. sets up and operates machine oxyfuel gas cutting equipment (track burner) to perform straight cutting and beveling operations;

3. performs minor external repairs to equipment and accessories.

E. Arc cutting and gouging:

1. removes metal using the air carbon arc cutting process;

2. carries out shape cutting operations using the manual plasma arc cutting process;

3. performs minor external repairs to equipment and accessories.

F. Inspection:

1. visually examines all personal welding and cutting assignments for unfavorable weld and cut edge surface discontinuities before final inspection by a supervisor.

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Chapter 57. Entry-Level Welding Technology Secondary Program

§5701. Rationale

A. The American Welding Society recognized the need for entry-level welders, and through a grant by the U.S.

Department of Education, formed the Education Grant Committee, and assigned it the task of preparing a standards guide.

B. Welding has become a very sophisticated and technical science, requiring not only mental application but also hands-on abilities. The future need for competent welders should prompt the establishment of a greater number of educational programs. Thus, it becomes imperative that the training given be of sufficient quality and quantity to prepare trainees for industrial assignments at various levels of skill development well into the next century. To this end, entry-level workers come to the workforce as prospective first-time practitioners of the craft.

C. Work Environment. Entry level welders are employed in a wide range of industries that use welding and welding-related tasks during the course of daily operations. This range of industries includes small, medium, and large union or nonunion facilities.

D. Occupational Hazards. As is the case in most metalworking industries, the potential for bodily harm and hazardous situations exists. High electrical currents and voltages are used to operate machinery and welding equipment. Machinery for shearing, forming, and punching various thicknesses of materials is used. Flammable and other compressed gases are used during flame cutting and welding operations. Welders may work in enclosed, restricted spaces, and at times at high elevations and in awkward positions. A hazardous noise level is sometimes generated during the production process. The welder must take safety precautions, and be safety conscious at all times.

E. Worker Profile. This position involves concentration, decision making, and physical tasks.

F. Physical Requirements. Entry-level welders must meet the physical requirements established by the employer.

G. Employability. Entry-level welders should exhibit good written, oral, and listening skills and be good at problem solving and decision making. These individuals should demonstrate good judgment, be dependable and interact well with people.

H. Education. Entry-level welders training is accomplished through secondary, postsecondary, vocational-technical schools, junior colleges, universities, apprenticeship, or employer-based welder training programs. Sufficient workplace skills (i.e., foundation skills such as reading, writing, math, science, communication skills, and adaptability skills) are required to complete requisite welding-related knowledge and skills training.

I. Curriculum Guidelines. It is the sole intent of these guidelines to define a competency-based welding curriculum. Therefore, it is the responsibility of the secondary, postsecondary, or employer-based training program to establish any guidelines for the duration of training and prerequisites related to basic skills (i.e., reading, writing, mathematics, and listening/oral communications). Training activities should consistently reinforce the use of basic skills.

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§5703. Industry-Based Certification and Academic Content Standards

A. Scope. The American Welding Society (AWS) guide establishes a minimum skill standard defining training and qualification requirements that are necessary for participating organizations to develop and administer an Entry-Level Welder Program in accordance with AWS QC10, *Specification for the Qualification and Certification for Entry-Level Welders*. This guide is intended to specify a credible path for secondary, postsecondary, or employer-based training facilities to build new programs and/or enhance existing programs to administer Entry-Level Welder training and qualification. Use of this guide is voluntary. Participating organizations desiring to certify a trainee as an AWS Certified Entry-Level Welder shall consider the training and qualification guidelines within this Subpart 7 as mandatory requirements under the requirements of AWS QC10.

B. Objectives

1. Provide training facilities with an industrial awareness of the occupational description, conditions, task listing, and profile that encompasses the job classification of entry-level welders.

2. Establish a broad competency-based curriculum detailing the minimum acceptable skill requirements for the training and qualification of entry-level welders.

3. Provide training facilities participating in the certification of entry-level welders with a list of learning objectives and learning activities necessary to accomplish entry-level welder training.

4. Provide training facilities participating in the certification of entry-level welders with the references needed to compare existing or new curriculum with the AWS documents specified in this guide.

5. Provide training facilities participating in the certification of entry-level welders information related to the administration of an entry-level welder closed book examination, workmanship qualification, and performance qualification testing.

C. Requirements

1. Unless the secondary, postsecondary, or employer-based training facility elects to become a participating organization under the requirements of AWS QC10, *Specification for the Qualification and Certification for Entry-Level Welders*, use of this Part 7 is voluntary.

2. Participating organizations shall meet the requirements of AWS QC10, *Specification for the Qualification and Certification for Entry-Level Welders*.

3. Participating organizations shall ensure that existing or new training materials are in compliance with the

AWS documents specified in the *Curriculum Guidelines* section of this guide.

4. Participating organizations shall administer a safety examination prior to trainee performance of tasks in the work area or laboratory, in accordance with the requirements of AWS QC10, *Specification for the Qualification and Certification for Entry-Level Welders*.

5. Participating organizations shall administer workmanship qualification testing at the end of training for each applicable welding or cutting process in accordance with the requirements of AWS QC10, *Specification for the Qualification and Certification for Entry-Level Welders*.

6. Participating organizations shall provide a means for trainees to take a closed book written examination based on the applicable subject matter.

7. Trainees desiring AWS Entry-Level Welder Certification shall pass workmanship qualification tests in accordance with the requirements of AWS QC10,

Specification for the Qualification and Certification for Entry-Level Welders.

8. Trainees desiring AWS Entry-Level Welder Certification shall pass a closed book written examination based on the applicable subject matter.

9. Trainees desiring AWS Entry-Level Welder Certification shall pass performance qualification tests in accordance with the requirements of AWS QC10, *Specification for the Qualification and Certification for Entry-Level Welders*.

10. Participating organizations shall keep training records reflecting the results of entry-level welder training, workmanship qualification, closed book examination, and performance qualification.

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Chapter 59. Course Standards

§5901. Entry Level Welder Training

Benchmarks	Louisiana Foundation Skills	Academic Cross-Reference (Standard-Benchmark)
A. OCCUPATIONAL ORIENTATION		English Language Arts
(1) Follow safe practices.	1, 3, 5	ELA 1 – H1, H3, H4, H5
(2) Prepare time or job cards, reports or records.	1, 2, 3	ELA 2 – H1, H2, H3, H4, H5, H6
(3) Perform housekeeping duties.	1, 3, 5	ELA 3 – H1, H2, H3
(4) Follow verbal instructions to complete work assignments.	1, 2	ELA 4 – H1, H2, H3, H4, H5, H6
(5) Follow written details to complete assignments.	1, 2	ELA 5 – H1, H2, H3, H4, H5, H6
		ELA 7 – H1,H2
B. DRAWING AND WELDING SYMBOL INTERPRETATIONS		Mathematics
(1) Interpret basic elements of a drawing or sketch.	1, 2	N – 1H, 2H, 3H, 4H, 5H, 6H, 7H
(2) Interpret welding symbol information.	1, 2	D – 7H, 9H
(3) Fabricate parts from a drawing or sketch.	1, 2, 3	A – 1H, 2H, 3H, 4H
		M – 1H, 2H, 3H, 4H
		G – 1H, 2H, 3H, 4H, 5H, 6H
		Social Studies
		G – 1A-H1, 1A-H2, 1D-H1, 1D-H2, 1D-H4, 1D-H5
		E – 1A-H1, 1A-H2, H1A-H3, 1A-H5, 1B-H1, 1B-H2, 1B-H4, 1B-H5, 1B-H6
		H – 1A-H1, 1A-H2, 1A-H5, 1A-H6
		Science
		SI-H – A1, A2, A3, A4, A5, A6, A7, B3, B4, B5
		PS-H – C1, C2, D1, D6, D7, E1, E2, E3, E4, F1, F2, G1, G2, G3, G4
		ESS-H – A1, A2, A3, A5, A6, A7, B1, B2, D7
		SE-H – A1, A2, A11, B1, B2, B3, B4, B5, B6, C1, C2, C3, C4, C5, D1, D2, D3, D4, D5, D6

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§5903. Arc Welding Principles and Practices

Benchmarks	Louisiana Foundation Skills	Academic Cross-Reference (Standard-Benchmark)
A. SHIELDED METAL ARC WELDING (SMAW)		English Language Arts
(1) Perform safety inspections of equipment and accessories.	1, 3, 5	ELA 1 – H1, H3, H4, H5 ELA 2 – H1, H2, H3, H4, H5, H6
(2) Make minor external repairs to equipment and accessories.	2, 3	ELA 3 – H1, H2, H3 ELA 4 – H1, H2, H3, H4, H5, H6 ELA 5 – H1, H2, H3, H4, H5, H6 ELA 7 – H1, H2
(3) Set up for shielded metal arc welding operations on plain carbon steel.	3, 4	Mathematics
(4) Operate shielded metal arc welding equipment.	2, 3, 4	N – 1H, 2H, 3H, 4H, 5H, 6H, 7H D – 7H, 9H
(5) Make fillet welds, all positions, on plain carbon steel.	2, 3, 4	A – 1H, 2H, 3H, 4H M – 1H, 2H, 3H, 4H
(6) Make groove welds, all positions, on plain carbon steel.	2, 3, 4	G – 1H, 2H, 3H, 4H, 5H, 6H
(7) Perform 2G-3G limited thickness qualification tests on plain carbon steel plate.	2, 3, 4	Social Studies
B. GAS METAL ARC WELDING (GMAW, GMAW-S)		G – 1A-H1, 1A-H2, 1D-H1, 1D-H2, 1D-H4, 1D-H5
(1) Perform safety inspections of equipment and accessories.	1, 3, 5	E – 1A-H1, 1A-H2, 1A-H3, 1A-H5, 1B-H1, 1B-H2, 1B-H4, 1B-H5, 1B-H6
(2) Make minor external repairs to equipment and accessories.	2, 3	H – 1A-H1, 1A-H2, 1A-H5, 1A-H6
(3) Set up for gas metal arc welding operations on plain carbon steel.	3, 4	Science
(4) Operate gas metal arc welding equipment.	2, 3, 4	SI-H – A1, A2, A3, A4, A5, A6, A7, B3, B4, B5
Short circuit transfer		PS-H - - C1, C2, D6, D7, E1, E2, E3, E4, F1, F2, G1, G2, G3, G4
(5) Make fillet welds, all positions, on plain carbon steel.	2, 3, 4	ESS-H – A1, A2, A3, A5, A6, A7, B1, B2, D7
(6) Make groove welds, all positions, on plain carbon steel.	2, 3, 4	SE-H – A1, A2, A11, B1, B2, B3, B4, B5, B6, C1, C2, C3, C4, C5, D1, D2, D3, D4, D5, D6
Spray transfer		
(7) Make 1F-2F welds on plain carbon steel.	2, 3, 4	
(8) Make 1G welds on plain carbon steel.	2, 3, 4	
C. FLUX CORED ARC WELDING (FCAW-G)		
(1) Perform safety inspections of equipment and accessories.	1, 3, 5	
(2) Make minor external repairs to equipment and accessories.	2, 3	
(3) Set up for flux cored arc welding operations on plain carbon steel.	3, 4	
(4) Operate flux cored arc welding equipment.	2, 3, 4	
(5) Make fillet welds, all positions, on plain carbon steel.	2, 3, 4	
(6) Make groove welds, all positions, on plain carbon steel.	2, 3, 4	
D. GAS TUNGSTEN ARC WELDING (GTAW)		
(1) Perform safety inspections of equipment and accessories.	1, 3, 5	
(2) Make minor external repairs to equipment and accessories.	2, 3	
(3) Set up gas tungsten arc welding operations on plain carbon steel, aluminum, and stainless steel.	3, 4	
(4) Operate gas tungsten arc welding equipment.	2, 3, 4	
(5) Make fillet welds, all positions, on plain carbon steel.	2, 3, 4	
(6) Make groove welds, all positions, on plain carbon steel.	2, 3, 4	
(7) Make 1F-2F welds on aluminum.	2, 3, 4	
(8) Make 1G welds on aluminum.	2, 3, 4	
(9) Make 1F-3F welds on stainless steel.	2, 3, 4	
(10) Make 1G-2G welds on stainless steel.	2, 3, 4	

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§5905. Oxyfuel Gas Cutting Principles and Practices

Benchmarks	Louisiana Foundation Skills	Academic Cross-Reference (Standard-Benchmark)
<p>A. MANUAL OXYFUEL GAS CUTTING (OFC)</p> <p>(1) Perform safety inspections of equipment and accessories.</p> <p>(2) Make minor external repairs to equipment and accessories.</p> <p>(3) Set up for manual oxyfuel gas cutting operations on plain carbon steel.</p> <p>(4) Operate manual oxyfuel cutting equipment.</p> <p>(5) Perform straight cutting operations on plain carbon steel.</p> <p>(6) Perform shape cutting operations on plain carbon steel.</p> <p>(7) Perform bevel cutting operations on plain carbon steel.</p> <p>(8) Remove weld metal from plain carbon steel using weld washing techniques.</p>	<p>1, 3, 5</p> <p>2, 3</p> <p>3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p>	<p>English Language Arts</p> <p>ELA 1 – H1, H3, H4, H5</p> <p>ELA 2 – H1, H2, H3, H4, H5, H6</p> <p>ELA 3 – H1, H2, H3</p> <p>ELA 4 – H1, H2, H3, H4, H5, H6</p> <p>ELA 5 – H1, H2, H3, H4, H5, H6</p> <p>ELA 7 – H1, H2</p> <p>Mathematics</p> <p>N – 1H, 2H, 3H, 4H, 5H, 6H, 7H</p> <p>D – 7H, 9H</p> <p>A – 1H, 2H, 3H, 4H</p> <p>M – 1H, 2H, 3H, 4H</p> <p>G – 1H, 2H, 3H, 4H, 5H, 6H</p> <p>Social Studies</p> <p>G – 1A-H1, 1A-H2, 1D-H1, 1D-H2, 1D-H4, 1D-H5</p> <p>E – 1A-H1, 1A-H2, 1A-H3, 1A-H5, 1B-H1, 1B-H2, 1B-H4, 1B-H5, 1B-H6</p> <p>H – 1A-H1, 1A-H2, 1A-H5, 1A-H6</p>
<p>B. MACHINE OXYFUEL GAS CUTTING (OFC)-[Track Burner]</p> <p>(1) Perform safety inspections of equipment and accessories.</p> <p>(2) Make minor external repairs to equipment and accessories.</p> <p>(3) Set up for manual oxyfuel gas cutting operations on plain carbon steel.</p> <p>(4) Operate manual oxyfuel gas cutting equipment.</p> <p>(5) Perform straight cutting operations on plain carbon steel.</p> <p>(6) Perform shape cutting operations on plain carbon steel.</p>	<p>1, 3, 5</p> <p>2, 3</p> <p>3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p>	<p>Science</p> <p>SI-H – A1, A2, A3, A4, A5, A6, A7, B3, B4, B5</p> <p>PS-H - - C1, C2, D6, D7, E1, E2, E3, E4, F1, F2, G1, G2, G3, G4</p> <p>ESS-H – A1, A2, A3, A5, A6, A7, B1, B2, D7</p> <p>SE-H – A1, A2, A11, B1, B2, B3, B4, B5, B6, C1, C2, C3, C4, C5, D1, D2, D3, D4, D5, D6</p>

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EDUCATION

§5907. Arc Cutting Principles and Practices

Benchmarks	Louisiana Foundation Skills	Academic Cross-Reference (Standard-Benchmark)
<p>A. AIR CARBON ARC CUTTING (CAC-A)</p> <p>(1) Perform safety inspections of equipment and accessories.</p> <p>(2) Make minor external repairs to equipment and accessories.</p> <p>(3) Set up for manual air carbon arc gouging and cutting operations on plain carbon steel.</p> <p>(4) Operate manual air carbon arc cutting equipment.</p> <p>(5) Perform metal removal operations on plain carbon steel.</p> <p>B. PLASMA ARC CUTTING (PAC)</p> <p>(1) Perform safety inspections of equipment and accessories.</p> <p>(2) Make minor external repairs to equipment and accessories.</p> <p>(3) Set up for manual plasma arc cutting operations on plain carbon steel, aluminum, and stainless steel.</p> <p>(4) Operate manual plasma arc cutting equipment.</p> <p>(5) Perform shape cutting operations on plain carbon steel, aluminum, and stainless steel.</p>	<p>1, 3, 5</p> <p>2, 3</p> <p>3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p> <p>1, 3, 5</p> <p>2, 3</p> <p>3, 4</p> <p>2, 3, 4</p> <p>2, 3, 4</p>	<p>English Language Arts</p> <p>ELA 1 – H1, H3, H4, H5</p> <p>ELA 2 – H1, H2, H3, H4, H5, H6</p> <p>ELA 3 – H1, H2, H3</p> <p>ELA 4 – H1, H2, H3, H4, H5, H6</p> <p>ELA 5 – H1, H2, H3, H4, H5, H6</p> <p>ELA 7 – H1, H2</p> <p>Mathematics</p> <p>N – 1H, 2H, 3H, 4H, 5H, 6H, 7H</p> <p>D – 7H, 9H</p> <p>A – 1H, 2H, 3H, 4H</p> <p>M – 1H, 2H, 3H, 4H</p> <p>G – 1H, 2H, 3H, 4H, 5H, 6H</p> <p>Social Studies</p> <p>G – 1A-H1, 1A-H2, 1D-H1, 1D-H2, 1D-H4, 1D-H5</p> <p>E – 1A-H1, 1A-H2, 1A-H3, 1A-H5, 1B-H1, 1B-H2, 1B-H4, 1B-H5, 1B-H6</p> <p>H – 1A-H1, 1A-H2, 1A-H5, 1A-H6</p> <p>Science</p> <p>SI-H – A1, A2, A3, A4, A5, A6, A7, B3, B4, B5</p> <p>PS-H - - C1, C2, D6, D7, E1, E2, E3, E4, F1, F2, G1, G2, G3, G4</p> <p>ESS-H – A1, A2, A3, A5, A6, A7, B1, B2, D7</p> <p>SE-H – A1, A2, A11, B1, B2, B3, B4, B5, B6, C1, C2, C3, C4, C5, D1, D2, D3, D4, D5, D6</p>

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§5909. Welding Inspection and Testing Principles

Benchmarks	Louisiana Foundation Skills	Academic Cross-Reference (Standard-Benchmark)
<p>A. VISUAL EXAMINATION PRINCIPLES AND PRACTICES</p> <p>(1) Examine cut surfaces and edges of prepared base metal parts.</p> <p>(2) Examine tack, intermediate layers, and completed welds.</p>	<p>2, 3, 4</p> <p>2, 3, 4</p>	<p>English Language Arts</p> <p>ELA 1 – H1, H3, H4, H5</p> <p>ELA 2 – H1, H2, H3, H4, H5, H6</p> <p>ELA 3 – H1, H2, H3</p> <p>ELA 4 – H1, H2, H3, H4, H5, H6</p> <p>ELA 5 – H1, H2, H3, H4, H5, H6</p> <p>ELA 7 – H1, H2</p> <p>Mathematics</p> <p>N – 1H, 2H, 3H, 4H, 5H, 6H, 7H</p> <p>D – 7H, 9H</p> <p>A – 1H, 2H, 3H, 4H</p> <p>M – 1H, 2H, 3H, 4H</p> <p>G – 1H, 2H, 3H, 4H, 5H 6H</p> <p>Social Studies</p> <p>G – 1A-H1, 1A-H2, 1D-H1, 1D-H2, 1D-H4, 1D-H5</p> <p>E – 1A-H1, 1A-H2, 1A-H3, 1A-H5, 1B-H1, 1B-H2, 1B-H4, 1B-H5, 1B-H6</p> <p>H – 1A-H1, 1A-H2, 1A-H5, 1A-H6</p> <p>Science</p> <p>SI-H – A1, A2, A3, A4, A5, A6, A7, B3, B4, B5</p> <p>PS-H- - C1, C2, D6, D7, E1, E2, E3, E4, F1, F2, G1, G2, G3, G4</p> <p>ESS-H – A1, A2, A3, A5, A6, A7, B1, B2, D7</p> <p>SE-H – A1, A2, A11, B1, B2, B3, B4, B5, B6, C1, C2, C3, C4, C5, D1, D2, D3, D4, D5, D6</p>

AUTHORITY NOTE: Promulgated in accordance with R.S. 17:6(A)(10) and R.S. 17:10.

HISTORICAL NOTE: Promulgated by the Department of Education, Board of Elementary and Secondary Education, Trade and Industrial Education, LR 30:2775 (December 2004).