

COLLISION REPAIR TECHNOLOGY MISSISSIPPI CURRICULUM FRAMEWORK

Program CIP: 47.0603-Autobody/Collision and Repair Technology/Technician

2017



Published by:

Mississippi Community College Board
Division of Workforce, Career, and Technical Education
3825 Ridgewood Road
Jackson, MS 39211
Phone: 601-432-6155
Email: curriculum@mccb.edu

FACULTY WRITING TEAM MEMBERS

Dylan Baldwin, Itawamba Community College, Tupelo, MS
Keith Cook, Mississippi Gulf Coast Community College, Gulfport, MS
Mike Franklin, Northwest Community College, Senatobia, MS
Luke Howell, East Central Community College, Decatur, MS
Justin Langford, Holmes Community College, Goodman, MS
Ovid Vickers, Hinds Community College, Raymond, MS

ADMINISTRATOR WRITING TEAM MEMBERS

Cindy West, Dean of Career and Technical Education
Hinds Community College, Raymond, MS

BUSINESS AND INDUSTRY CONTRIBUTING TEAM MEMBERS

Wesley Bray, Pro-cision Collision, Tupelo, MS
Ann Chapman, New Look Auto Body, Ellisville, MS
Leon Hemphill, Capital Body Shop, Jackson, MS*
Hal Hilton, Advanced Collision, Gulfport, MS
Trent Hitt, Coachworks, Decatur, MS
Tim Holcomb, Crump Body and Paint, Tupelo, MS
Jeff Johnson, PPG, New Orleans, LA
Bod McGuire, Knights Body Shop, Gulfport, MS
Colby Skelton, Taj Motorsports, Decatur, MS
Joe Warren, Precision Auto Parts, Meridian, MS

***Denotes industry members who attended the writing meeting**

OFFICE OF CURRICULUM AND INSTRUCTION TEAM MEMBERS

Angela Bryan, Ph.D., Director of Curriculum, Mississippi Community College Board
Teresa A. Barnes, Ph.D., Curriculum Specialist, Mississippi Community College Board
Latoya Sterling, Curriculum Specialist, Mississippi Community College Board

Student Learning Outcomes are from the *NATEF Program Accreditation Standards* by National Automotive Technicians Education Foundation, 2016, Leesburg, VA. Copyright 2016. Reprinted with permission.

The Office of Curriculum and Instruction (OCI) was founded in 2013 under the Division of Workforce, Career, and Technical Education at the Mississippi Community College Board (MCCB). The office is funded through a partnership with The Mississippi Department of Education (MDE), who serves as Mississippi's fiscal agent for state and federal Career and Technical Education (CTE) Funds. The OCI is tasked with developing statewide CTE curriculum, programming, and professional development designed to meet the local and statewide economic demand.

Copyright® 2017 by Mississippi Community College Board
For information, please contact curriculum@mccb.edu

Contents

NATIONAL CERTIFICATION & STANDARDS	5
INDUSTRY JOB PROJECTION DATA.....	6
ARTICULATION.....	7
TECHNICAL SKILLS ASSESSMENT.....	7
ONLINE AND BLENDED LEARNING OPPORTUNITIES.....	7
INSTRUCTIONAL STRATEGIES.....	7
ASSESSMENT STRATEGIES.....	7
RESEARCH ABSTRACT	8
REVISION HISTORY:	8
PROGRAM DESCRIPTION	9
SUGGESTED COURSE SEQUENCE.....	10
ACCELERATED INTEGRATED CAREER PATHWAY.....	10
CAREER CERTIFICATE REQUIRED COURSES	10
TECHNICAL CERTIFICATE REQUIRED COURSES.....	11
GENERAL EDUCATION CORE COURSES.....	12
COLLISION REPAIR TECHNOLOGY COURSES	13
COURSE DESCRIPTIONS	14
ABT 1146 Structural Analysis and Damage Repair I.....	14
ABT 1223 Non-Structural Analysis and Damage Repair I.....	16
ABT 1236 Non-Structural Analysis and Damage Repair II.....	17
ABT 1313 Refinishing I	19
ABT 1323 Refinishing II	21
ABT 1443 Mechanical and Electrical Components I	23
ABT 1453 Mechanical and Electrical Components II	25
ABT 1153 Structural Analysis and Damage Repair II.....	27
ABT 2163 Structural Analysis and Damage Repair III.....	28
ABT 2243 Non-Structural Analysis and Damage Repair III	29
ABT 2336 Refinishing III	30
ABT 2713 Collision Analysis and Estimation.....	31
ABT 2813 Shop Operations and Procedures	32
ABT 291(1-3) Special Problem in Collision Repair Technology	33
ABT 292(1-6) Supervised Work Experience in Collision Repair Technology	34
RECOMMENDED TOOLS AND EQUIPMENT	35
CURRICULUM DEFINITIONS AND TERMS.....	39

NATIONAL CERTIFICATION & STANDARDS

NATEF: NATIONAL AUTOMOTIVE TECHNICIANS EDUCATION FOUNDATION

Founded in 1983 as an independent, non-profit 501 (c)(3) organization the mission of the National Automotive Technicians Education Foundation (NATEF) is to improve the quality of automotive technician training programs nationwide at secondary and postsecondary, public and proprietary schools. To accomplish this mission NATEF examines the structure, resources and quality of training programs and evaluates them against standards established by the industry. These standards reflect the skills that students must master to be successful in the industry. NATEF also works with students to increase career awareness opportunities in the automotive repair industry.

ASE INDUSTRY EDUCATION ALLIANCE

A network of affiliated organizations bonded together by a common goal: to educate, prepare and inspire a new kind of automotive service workforce. One that embraces innovation, today's workforce demands and critical thinking. One that is career-ready, eager and committed. The ASE Industry Education Alliance has designed a powerful new way of preparing students to meet today's demands.

ASE STUDENT CERTIFICATION

ASE Student Certification is a powerful means to distinguish candidates to potential employers. For students in automotive service training, a student certification from ASE signals quality and excellence in workforce preparedness. It shows a commitment to the industry, a passion for innovation, and a belief in building a strong next-generation workforce. It tells employers that you're not only skilled, but you're professional and trustworthy.

ASE Student Certification offers the following benefits.

- Available to all students in CTE Automotive programs
- Delivered via Internet at the School
- Tests proctored by school staff
- Results are available immediately
- No work experience requirement
- Certification valid for two years

ASE Student Certification tests are similar to higher-level ASE certification tests and are developed using the same techniques. The program is specifically designed for an individual nearing the end of formal automotive studies. ASE Student Certification offers an industry-recognized credential to jump start careers.

For more information related to ASE, please visit www.ase.com.

INDUSTRY JOB PROJECTION DATA

The Automotive Body and related repairs, Automotive Glass Installers and repairs, Painters, and Auto Damage Insurance Appraisers require long-term on the job training. There is expected to be an 8.16% increase in occupational demand at the regional level and the state level and 6.97% increase at the national level. Median annual income for this occupation is \$40, 690 at the state level. A summary of occupational data from www.swib.ms.gov/DataCenter/ is displayed below:

Table 1: Education Level

Program Occupations	Education Level
AUTOMOTIVE BODY AND RELATED REPAIRS	LONG-TERM ON THE JOB TRAINING
AUTOMOTIVE GLASS INSTALLERS AND REPAIRS	LONG-TERM ON THE JOB TRAINING
PAINTERS	LONG-TERM ON THE JOB TRAINING
AUTO DAMAGE INSURANCE APPRAISERS	LONG-TERM ON THE JOB TRAINING

Table 2: Occupational Overview

	Region	State	United States
2014 Occupational Jobs	2026	2026	218724
2024 Occupational Jobs	2147	2147	229025
Total Change	121	121	10301
Total % Change	5.97%	5.97%	4.71%
2014 Median Hourly Earnings	\$19.56	\$17.51	\$20.60
2014 Median Annual Earnings	\$40, 690	\$36, 413.14	\$42, 840.49
Annual Openings	12	12	1030

Table 3: Occupational Breakdown

Description	2014 Jobs	2024 Jobs	Annual Openings	2014 Hourly Earnings	2014 Annual Earnings 2,080 Work Hours
AUTOMOTIVE BODY AND RELATED REPAIRS	57	57	0	\$27.28	\$56,742.40
AUTOMOTIVE GLASS INSTALLERS AND REPAIRS	1324	1432	10	\$16.90	\$35,152.00
PAINTERS	136	143	0	\$17.07	\$35,505.60
AUTO DAMAGE INSURANCE APPRAISERS	509	515	0	\$17.00	\$35,360.00

Table 4: Occupational Change

Description	Regional Change	Regional % Change	State % Change	National % Change
AUTOMOTIVE BODY AND RELATED REPAIRS	0	0.00%	0.00%	-0.29%
AUTOMOTIVE GLASS INSTALLERS AND REPAIRS	108	8.16%	8.16%	6.97%
PAINTERS	7	5.15%	5.15%	1.15%
AUTO DAMAGE INSURANCE APPRAISERS	6	1.18%	1.18%	1.04%

ARTICULATION

Articulation credit from Secondary Collision Repair Technology to Postsecondary Collision Repair Technology will be awarded upon implementation of this curriculum by the college. The course to be articulated is Refinishing I (ABT 1314) with the stipulation of passing the MS-CPAS2.

Articulated Secondary Program	Postsecondary Program	Articulated Postsecondary Course
S 2015 Collision Repair Technology	PS 2018 Collision Repair Technology (CIP: 47.0603)	ABT 1314-Refinishing I

TECHNICAL SKILLS ASSESSMENT

Colleges should report the following for students who complete the program with a career certificate, technical certificate, or an Associate of Applied Science Degrees for technical skills attainment. To use the approved Alternate Assessment for the following programs of study, colleges should provide a Letter of Notification to the Director of Career Technical Education at the MS Community College Board. Please see the following link for further instructions: <http://www.mccb.edu/wkfEdu/CTDefault.aspx>.

CIP Code	Program of Study	
47.0603	Collision Repair Technology	
Level	Standard Assessment	Alternate Assessment
Career	MS-CPAS-2 Postsecondary	Automotive Service Excellence (ASE) Test Series: Structural Analysis and Damage Repair
Level	Standard Assessment	
Technical	MS-CPAS-2 Postsecondary	Automotive Service Excellence (ASE) Test Series: Painting and Refinishing

ONLINE AND BLENDED LEARNING OPPORTUNITIES

Course content includes lecture and laboratory semester credit hours. Faculty members are encouraged to present lecture related content to students in an online or blended learning environment. Training related to online and blended learning will be available to faculty members through the MS Community College Board.

INSTRUCTIONAL STRATEGIES

Instructional strategies for faculty members implementing the curriculum can be found through the Office of Curriculum and Instruction's professional development.

ASSESSMENT STRATEGIES

The Office of Curriculum and Instruction's professional development offer assessment strategies to faculty members implementing the curriculum. Additionally, standards were included in course content when appropriate.

RESEARCH ABSTRACT

In the spring of 2017, the Office of Curriculum and Instruction (OCI) met with the different industry members who made up the advisory committees for the Collision Repair Technology program. An industry questionnaire was used to gather feedback concerning the trends and needs, both current and future, of their field. Program faculty, administrators, and industry members were consulted regarding industry workforce needs and trends.

Industry advisory team members from the college involved with this program were asked to give input related to changes to be made to the curriculum framework. Specific comments related to soft skills needed in this program include having a positive attitude, being at work every day and on time, and having reading and writing skills to complete work orders and other forms. Occupation-specific skills stated include knowing how to communicate with the customers, basic math skills, troubleshooting with customer concerns, and understanding the importance of confidentiality.

Included in this revision is the realignment of several courses. In addition, two elective courses were added Collision Analysis and Estimation (ABT 2713) and Shop Operations and Procedures (ABT 2813).

Realignment of Courses

2011 Curriculum	2017 Curriculum
Structural Analysis and Damage Repair I (ABT 1143)	Structural Analysis and Damage Repair I (ABT 1146)
Collision Welding and Cutting (ABT 1213)	
Structural Analysis and Damage Repair II (ABT 1153)	
Non-Structural Analysis and Damage Repair II (ABT 1233)	Non-Structural Analysis and Damage Repair II (ABT 1236)
Non-Structural Analysis and Damage Repair III (ABT 2163)	
Refinishing III (ABT 2333)	Refinishing III (ABT 2336)
Refinishing IV (ABT 2343)	
Structural Analysis and Damage Repair IV (ABT 2173)	Structural Analysis and Damage Repair III
Non-Structural Analysis and Damage Repair IV (ABT 2253)	Non-Structural Analysis and Damage Repair III

REVISION HISTORY:

2007, Revised Research and Curriculum Unit, Mississippi State University
2011, Revised, Research and Curriculum Unit, Mississippi State University
2017, Revised, Office of Curriculum and Instruction, Mississippi Community College Board

PROGRAM DESCRIPTION

Collision Repair Technology is an instructional program designed to prepare students for entry-level into the collision repair and refinishing trade. Upon completion of this program, the students will be prepared for beginning positions as body, frame, and refinish technicians. Students will be provided theory and practical repair and refinish work beginning with basic applications and progressing on to heavy collision repairs requiring major body and frame alignment and panel replacement. The instruction includes all phases necessary to teach collision repair including glass replacement, welding, hardware and trim items replacement, cosmetic repairs, and structural repairs.

Industry standards referenced are from the *2016 ASE/NATEF Collision Repair & Refinish Standards (Painting and Refinishing, Non-Structural and Structural Analysis and Damage Repair, Mechanical & Electrical Components)*.

SUGGESTED COURSE SEQUENCE

ACCELERATED INTEGRATED CAREER PATHWAY

			SCH Breakdown			Program Certifications
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	
ABT 1313	Refinishing I	3	1	4	75	
ABT 1223	Non-Structural Analysis and Damage Repair I	3	2	2	60	
	Technical Electives	9				
	Total	15				

CAREER CERTIFICATE REQUIRED COURSES

			SCH Breakdown			Program Certifications
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	
ABT 1146	Structural Analysis and Damage Repair I	6	3	6	135	ASE Non- Structural Analysis and Damage Repair
ABT 1223	Non-Structural Analysis and Damage Repair I	3	2	2	60	
ABT 1313	Refinishing I	3	1	4	75	
ABT 1443	Mechanical and Electrical Components I	3	3	0	45	
ABT 1236	Non-Structural Analysis and Damage Repair II	6	3	6	135	
ABT 1453	Mechanical and Electrical Components II	3	3	0	45	
ABT 1323	Refinishing II	3	1	4	75	
ABT 1153	Structural Analysis and Damage Repair II	3	2	2	60	
	TOTAL	30				

TECHNICAL CERTIFICATE REQUIRED COURSES

			SCH Breakdown			Program Certifications
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Total Contact Hours	
ABT 2336	Refinishing III	6	2	8	150	ASE Painting and Refinishing
ABT 2163	Structural Analysis and Damage Repair III	3	2	2	60	
ABT 2243	Non-Structural Analysis and Damage Repair III	3	2	2	60	
	Technical Elective	3				
	TOTAL	15				

GENERAL EDUCATION CORE COURSES

To receive the Associate of Applied Science Degree, a student must complete all of the required coursework found in the Career Certificate option, Technical Certificate option and a minimum of 15 semester hours of General Education Core. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester or provided primarily within the last semester. Each community college will specify the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college. The Southern Association of Colleges and Schools (SACS) Commission on Colleges Standard 2.7.3 from the Principles of Accreditation: Foundations for Quality Enhancement¹ describes the general education core.

Section 2.7.3 In each undergraduate degree program, the institution requires the successful completion of a general education component at the collegiate level that (1) is substantial component of each undergraduate degree, (2) ensures breadth of knowledge, and (3) is based on a coherent rationale. For degree completion in associate programs, the component constitutes a minimum of 15 semester hours or the equivalent. These credit hours are to be drawn from and include at least one course from the following areas: humanities/fine arts, social/behavioral sciences, and natural science/mathematics. The courses do not narrowly focus on those skills, techniques, and procedures specific to a particular occupation or profession.

Course Number	Course Name	Semester Credit Hours	SCH Breakdown		Total Contact Hours	Program Certifications
			Lecture	Lab		
	Humanities/Fine Arts	3				
	Social/Behavioral Sciences	3				
	Math/Science	3				
	Other academic courses per local community college requirements for AAS degree	6				
	TOTAL	15				

¹

Southern Association of Colleges and Schools Commission on Colleges. (2012). *The principles of accreditation: Foundations for quality enhancement*. Retrieved from <http://www.sacscoc.org/pdf/2012PrinciplesOfAcrcditation.pdf>

COLLISION REPAIR TECHNOLOGY COURSES

*Any course not listed as a required course may be used as an elective.

			SCH Breakdown				Program Certifications
Course Number	Course Name	Semester Credit Hours	Lecture	Lab	Externship	Total Contact Hours	
ABT 1146	Structural Analysis and Damage Repair I	6	3	6		135	
ABT 1153	Structural Analysis and Damage Repair II	3	2	2		60	
ABT 1223	Non-Structural Analysis and Damage Repair I	3	2	2		60	
ABT 1236	Non-Structural Analysis and Damage Repair II	6	3	6		1365	
ABT 1313	Refinishing I	3	1	4		75	
ABT 1323	Refinishing II	3	1	4		75	
ABT 1443	Mechanical and Electrical Components I	3	3	0		45	
ABT 1453	Mechanical and Electrical Components II	3	3	0		45	
ABT 2163	Structural Analysis and Damage Repair III	3	2	2		60	
ABT 2243	Non-Structural Analysis and Damage Repair III	3	2	2		60	
ABT 2336	Refinishing III	6	2	8		150	
ABT 2713	Collision Analysis and Estimation	3	2	2		60	
AB T 2813	Shop Operations and Procedures	3	2	2		60	
ABT 291(1-3)	Special Problem in Collision Repair Technology	1-3	0	2-6		30-90	
ABT 292(1-6)	Supervised Work Experience in Collision Repair Technology	1-6	0	0	3-18	45-270	
	All other electives approved by instructor per local community college policy						

COURSE DESCRIPTIONS

Course Number and Name: **ABT 1146** **Structural Analysis and Damage Repair I**

Description: A course to provide skills and practice in structural analysis and repair procedures that are used in the collision repair industry. This course also covers the complete inspection and non-structural analysis of damaged vehicles. It is designed to enable the student to determine the conditions and severity of the damage, the repair or replacement of parts, the estimated repair time, and correct use of reference manuals.

Hour Breakdown:	Semester Credit Hours	Lecture	Lab	Contact Hours
	6	3	6	135

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Apply methods of repair, and use tools to rough out and bump out auto panels.
 - a. Analyze types of sheet metal damage.
 - b. Use hammer and dolly to rough out a panel.
 - c. Use pull rods or slide hammer to rough out a panel.
 - d. Use pry pick to rough out a panel.
 - e. Use a body spoon to rough out a panel.
 - f. Use vacuum cups to rough out a panel.
 - g. Use heat shrinking methods to rough out a panel.
 - h. Use cold shrinking methods to rough out a panel.
 - i. Apply pressure and tension in relation to panel shape and reinforcement.
 - j. Repair sheet metal using welded stud repair methods.
2. Perform simple sheet metal repairs.
 - a. Use body filler to make simple sheet metal repairs.
 - b. Use fiberglass to make panel repair.
 - c. Use sheet metal patch to make panel repair.
3. Explore fixed glass practices and procedures.
 - a. Describe laminated and tempered glass.
 - b. Describe modular and solar glass.
 - c. Remove and reinstall or replace fixed glass (heated and non-heated) using recommended materials and techniques.
 - d. Remove and reinstall or replace modular glass using recommended materials.
Check for water leaks, dust leaks, and wind noise.
4. Explore metal welding and cutting practices and procedures.
 - a. Identify weldable and non-weldable substrates used in vehicle construction.
 - b. Weld and cut high-strength steel and other steels.
 - c. Weld and cut aluminum.
 - d. Determine the correct GMAW (MIG) welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation.
 - e. Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stick-out, voltage, polarity, flow rate, and wire-feed speed required for the substrate being welded.
 - f. Store, handle, and install high-pressure gas cylinders.
 - g. Determine work clamp (ground) location and attach.
 - h. Use the proper angle of the gun to the joint and direction of gun travel for the type of weld being made in the flat, horizontal, vertical, and overhead positions.

- i. Protect adjacent panels, glass, vehicle interior, and so forth from welding and cutting operations.
- j. Protect computers and other electronic control modules during welding procedures.
- k. Clean and prepare the metal to be welded, assure good metal fit-up, apply weld-through primer if necessary, and clamp or tack as required.
- l. Determine the joint type (butt weld with backing, lap, etc.) for weld being made.
- m. Determine the type of weld (continuous, stitch weld, plug, etc.) for each specific welding operation.
- n. Perform the following welds: continuous, plug, butt weld with and without backing, and fillet.
- o. Perform visual and destructive tests on each weld type.
- p. Identify the causes of various welding defects; make necessary adjustments.
- q. Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments.
- r. Identify cutting process for different substrates and locations; perform cutting operation.
- s. Identify different methods of attaching structural components [squeeze type resistance spot welding (STRSW), riveting, structural adhesive, and silicon bronze].

NATEF Standards Category:

Structural Analysis and Damage Repair

Damage Analysis, Estimating and Customer Service

ASE Technical Area:

Structural Analysis and Damage Repair

Content Area(s):

Unibody Inspection, Measurement and Repair

Fixed Glass

Metal Welding and Cutting

Course Number and Name: **ABT 1223** **Non-Structural Analysis and Damage Repair I**

Description: A course in the procedures and practices for metal finishing and body filling. This course also covers the complete inspection and non-structural analysis of damaged vehicles. It is designed to enable the student to determine the conditions and severity of the damage, the repair or replacement of parts, the estimated repair time, and correct use of reference manuals.

Hour Breakdown:	Semester Credit Hours	Lecture	Lab	Contact Hours
	3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explain and apply procedures for use of collision and reference manuals.
 - a. Demonstrate the use of repair manuals and estimating systems crash books, parts books, and flat rate manuals, including computerized systems.
 - b. Discuss legal aspects of body repair.
 - c. Discuss practices for analyzing damage and estimating repair procedures utilizing manual and computerized systems.
 - d. Discuss factors to consider in determining whether to replace or repair a part.
 - e. Estimate time required for repair or replacement of parts.
 - f. Prepare estimates for various body repair jobs.
 - g. Discuss factors to consider in determining whether to repair or "total" a vehicle.
2. Explore and apply metal finishing and body filling principles and practices.
 - a. Remove paint from the damaged area of a body panel.
 - b. Locate and repair surface irregularities on a damaged body panel.
 - c. Demonstrate hammer and dolly techniques.
 - d. Heat shrink stretched panel areas to proper contour.
 - e. Cold shrink stretched panel areas to proper contour.
 - f. Mix and apply body filler.
 - g. Rough sand body filler to contour; finish sand.
 - h. Determine the proper metal finishing techniques for aluminum.
 - i. Determine proper application of body filler to aluminum.

NATEF Standards Category:

Non-Structural Analysis and Damage Repair (Body Components)

ASE Technical Area:

Non-Structural Analysis and Damage Repair

Content Area(s):

Metal Finishing and Body Filling

Course Number and Name: **ABT 1236** **Non-Structural Analysis and Damage Repair II**

Description: This course is a continuation of Non-Structural Analysis and Damage Repair I. This course provides instruction for preparation principles and practices. This course provides instruction for outer body panel repair, replacement, and adjustment principles and practices.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
6	3	6	135

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explore and apply preparation principles and practices.
 - a. Review damage report, and analyze damage to determine appropriate methods for overall repair; develop and document a repair plan.
 - b. Inspect, remove, store, and replace exterior trim and moldings.
 - c. Inspect, remove, store, and replace interior trim and components.
 - d. Inspect, remove, store, and replace body panels and components that may interfere with or be damaged during repair.
 - e. Inspect, remove, store, and replace vehicle mechanical and electrical components that may interfere with or be damaged during repair.
 - f. Protect panels, glass, parts and other vehicle adjacent to the repair area.
 - g. Soap and water wash entire vehicle for inspection.
 - h. Prepare damaged area using water based and solvent based cleaners.
 - i. Remove corrosion protection, undercoatings, sealers, and other protective coatings as necessary to perform repairs.
 - j. Inspect, remove, and reinstall repairable plastics and other components for off-vehicle repair.
 2. Explore and apply outer body panel repair, replacement, and adjustment principles and practices.
 - a. Determine the extent of direct (primary) and indirect (secondary) damage and direction of impact; develop and document a repair plan.
 - b. Inspect, remove, and replace bolted, bonded, and welded steel panel or panel assemblies.
 - c. Determine the extent of damage to aluminum body panels; repair or replace.
 - d. Inspect, remove, replace, and align hood, hood hinges, and hood latch.
 - e. Inspect, remove, replace, and align deck lid, lid hinges, and lid latch.
 - f. Inspect, remove, replace, and align doors, latches, hinges, and related hardware.
 - g. Inspect, remove, replace, and align tailgates, hatches, liftgates, and sliding doors.
 - h. Inspect, remove, replace, and align bumper bars, covers, reinforcement, guards, isolators, and mounting hardware.
 - i. Inspect, remove, replace, and align front fenders, headers, and other panels.
 - j. Straighten contours of damaged panels to a suitable condition for body filling or metal finishing using power tools, hand tools, and weld-on pulling attachments.
 - k. Weld damaged or torn steel body panels; repair broken welds.
 - l. Restore corrosion protection.
 - m. Replace door skins.
 - n. Restore sound deadeners and foam materials.
 - o. Perform panel bonding.
 - p. Diagnose and repair water leaks, dust leaks, and wind noise.
- Identify one-time use fasteners.

NATEF Standards Category:

Non-Structural Analysis and Damage Repair (Body Components)

ASE Technical Area:

Non- Structural Analysis and Damage Repair

Content Area(s):

Preparation

Outer Body Panel Repairs, Replacements, and Adjustments

Course Number and Name: **ABT 1313 Refinishing I**

Description: A course to provide skills and practices in vehicle preparation, cleaning, sanding, metal treatment, and masking. Included is determining imperfections in paint jobs. Emphasis is placed upon personal safety and environmental concerns.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explore and apply safety precautions.
 - a. Identify and take necessary precautions with hazardous operations and materials according to federal, state, and local regulations.
 - b. Identify safety and personal health hazards according to OSHA guidelines and the "Right to Know Law."
 - c. Inspect spray environment and equipment to ensure compliance with federal, state, and local regulations and for safety and cleanliness hazards.
 - d. Select and use a NIOSH approved air purifying respirator. Inspect condition and ensure fit and operation. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulations.
 - e. Select and use NIOSH approved supplied air (Fresh Air Make-up) personal respirator system.
 - f. Perform proper maintenance in accordance with OSHA Regulation 1910.134 and applicable state and local regulations.
 - g. Select and use the proper personal safety equipment for surface preparation, spray gun and related equipment operation, paint mixing, matching and application, paint defects, and detailing (gloves, suits, hoods, eye and ear protection, etc.).
2. Explore and apply surface preparation practices and procedures.
 - a. Inspect, remove, store, and replace exterior trim and components necessary for proper surface preparation.
 - b. Soap and water wash entire vehicle; use appropriate cleaner to remove contaminants.
 - c. Inspect and identify substrate, type of finish, surface condition, and film thickness; develop and document a plan for refinishing using a total product system.
 - d. Dry or wet sand areas to be refinished.
 - e. Featheredge damaged areas to be refinished.
 - f. Apply suitable metal treatment or primer in accordance with total product systems.
 - g. Mask and protect other areas that will not be refinished.
 - h. Mix primer, primer-surfacer, or primer-sealer.
 - i. Apply primer onto surface of repaired area.
 - j. Apply two-component finishing filler to minor surface imperfections.
 - k. Dry or wet sand area to which primer-surfacer has been applied.
 - l. Dry sand area to which two-component finishing filler has been applied.
 - m. Remove dust from area to be refinished, including cracks or moldings of adjacent areas.
 - n. Clean area to be refinished using a final cleaning solution.
 - o. Remove, with a tack rag, any dust or lint particles from the area to be refinished.
 - p. Apply suitable sealer to the area being refinished.
 - q. Scuff sand to remove nibs or imperfections from a sealer.
 - r. Apply stone chip resistant coating.

- s. Restore corrosion-resistant coatings, caulking, and seam sealers to repaired areas.
- t. Prepare adjacent panels for blending.
- u. Identify the types of rigid, semi-rigid, or flexible plastic parts to be refinished; determine the materials, preparation, and refinishing procedures.
- v. Identify aluminum parts to be refinished; determine the materials, preparation, and refinishing procedures.

NATEF Standards Category:

Painting and Refinishing

ASE Technical Area:

Painting and Refinishing

Content Area(s):

Safety Precautions

Surface Preparation

ABT 1323 Refinishing II

Description: Continuation of Refinishing I. Included are types of paint defects and paint gun application and maintenance procedures.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	1	4	75

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explore spray gun and related equipment operations.
 - a. Inspect, clean, and determine condition of spray guns and related equipment (air hoses, regulators, airlines, air source, and spray environment).
 - b. Check and adjust spray gun operation for HVLP (high volume, low pressure) or compliant spray guns.
 - c. Set up (fluid needle, nozzle, and cap), test, and adjust spray gun using fluid, air, and pattern control valves.
 - d. Demonstrate an understanding of the operation of pressure spray equipment.
2. Explore paint defects (causes and cures).
 - a. Identify blistering (raising of the paint surface); determine the cause(s), and correct the condition.
 - b. Identify blushing (milky or hazy formation); determine the cause(s), and correct the condition.
 - c. Identify a dry spray appearance in the paint surface; determine the cause(s), and correct the condition.
 - d. Identify the presence of fish-eyes (crater-like openings) in the finish; determine the cause(s), and correct the condition.
 - e. Identify lifting; determine the cause(s), and correct the condition.
 - f. Identify clouding (mottling and streaking in metallic finishes); determine the cause(s), and correct the condition.
 - g. Identify orange peel; determine the cause(s), and correct the condition.
 - h. Identify overspray; determine the cause(s), and correct the condition.
 - i. Identify solvent popping in freshly painted surface; determine the cause(s), and correct the condition.
 - j. Identify sags and runs in paint surface; determine the cause(s), and correct the condition.
 - k. Identify sanding marks (sand scratch swelling); determine the cause(s), and correct the condition.
 - l. Identify contour mapping (shrinking and splitting) while finish is drying; determine the cause(s), and correct the condition.
 - m. Identify color difference (off-shade); determine the cause(s), and correct the condition.
 - n. Identify tape tracking; determine the cause(s), and correct the condition.
 - o. Identify low gloss condition; determine the cause(s), and correct the condition.
 - p. Identify poor adhesion; determine the cause(s), and correct the condition.
 - q. Identify paint cracking (crow's feet or line-checking, micro-checking, etc.); determine the cause(s), and correct the condition.
 - r. Identify corrosion; determine the cause(s), and correct the condition.
 - s. Identify dirt or dust in the paint surface; determine the cause(s), and correct the condition.
 - t. Identify water spotting; determine the cause(s), and correct the condition.
 - u. Identify finish damage caused by bird droppings, tree sap, and other natural causes; correct the condition.
 - v. Identify finish damage caused by airborne contaminants (acids, soot, rail dust, and other industrial-related causes); correct the condition.

- w. Identify die-back conditions (dulling of the paint film showing haziness); determine the cause(s) and correct the condition.
- x. Identify chalking (oxidation); determine the cause(s), and correct the condition.
- y. Identify bleed-through (staining); determine the cause(s), and correct the condition.
- z. Identify pin-holing; determine the cause(s), and correct the condition.
- aa. Identify buffing-related imperfections (swirl marks, wheel burns); correct the condition.
- bb. Identify pigment flotation (color change through film build); determine the cause(s), and correct the condition.
- cc. Measure mil thickness.

NATEF Standards Category:

Painting and Refinishing

ASE Technical Area:

Painting and Refinishing

Content Area(s):

Spray Gun and Related Equipment Operations

Paint Defects Causes and Cures

Paint Mixing, Matching and Applying

Course Number and Name: **ABT 1443** **Mechanical and Electrical Components I**

Description: A course designed to provide theory and practice in the areas of restraint systems, cooling systems, and air conditioning/heating systems. An introduction to small business management techniques as applied to the collision repair shop includes computerized information and record systems. Also included are financial responsibilities, shop layout, inventory, and employee-employer relations.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explore restraint systems.
 - a. Identify vehicle manufacturer's SRS recommended procedures before inspecting or replacing components.
 - b. Inspect, remove, and replace seatbelt and shoulder harness assembly and components.
 - c. Inspect restraint system mounting areas for damage; repair as needed.
 - d. Verify proper operation of seatbelt.
 - e. Deactivate and reactivate Supplemental Restraint System (SRS).
 - f. Inspect, remove, and replace Supplemental Restraint Systems (SRS) sensors and wiring; ensure sensor orientation.
 - g. Verify that Supplemental Restraint System (SRS) is operational.
 - h. Inspect, remove, replace, and dispose of deployed and non-deployed airbag(s) and pre-tensioners.
 - i. Use Diagnostic Trouble Codes (DTC) to diagnose and repair the Supplemental Restraint System (SRS).
 - j. Demonstrate an understanding of advanced restraint systems.
2. Explore cooling systems.
 - a. Check engine cooling and heater system hoses and belts; determine needed repairs.
 - b. Inspect, test, remove, and replace radiator, pressure cap, coolant recovery system, and water pump.
 - c. Recover, refill, and bleed system with proper coolant and check level of protection; leak test system and dispose of materials in accordance with EPA specifications.
 - d. Remove, inspect, and replace fan (both electrical and mechanical), fan sensors, fan pulley, fan clutch, and fan shroud, check operation.
 - e. Inspect, remove, and replace auxiliary oil/fluid coolers; check oil levels.
 - f. Demonstrate an understanding of hybrid cooling systems.
3. Explore heating and air conditioning.
 - a. Identify and comply with environmental concerns relating to refrigerants and coolants.
 - b. Maintain and verify correct operation of certified refrigerant recovery and recharging equipment.
 - c. Locate and identify A/C system service ports.
 - d. Identify, recover, label, and store refrigerant from A/C system.
 - e. Recycle refrigerant in accordance with EPA regulations.
 - f. Evacuate and recharge A/C system; check for leaks.
 - g. Identify oil type and maintain correct amount in A/C system.
 - h. Inspect, adjust, and replace A/C compressor drive belts; check pulley alignment.
 - i. Remove and replace A/C compressor; inspect and repair/replace A/C compressor mount.
 - j. Inspect, repair or replace A/C system mufflers, hoses, lines, fittings, orifice tube, expansion valve,

- and seals.
- k. Inspect, test, and replace A/C system condenser and mounts.
- l. Inspect and replace receiver/drier or accumulator/drier.
- m. Inspect and repair A/C component wiring.
- n. Demonstrate an understanding of safe handling procedures associated with high voltage A/C compressors and wiring.
- 4. Explain procedures for the operation of a collision repair business.
 - a. Describe the operation of a small business.
 - b. Describe financial records required by small businesses.
 - c. Complete forms and records used in automotive body repair using computer equipment and software.
 - d. Describe procedures and forms for taking and maintaining an inventory.
 - e. Describe practices for maintaining good employer/employee relationships.
 - f. Describe legal responsibilities of a collision repair shop owner.
 - g. Design the layout of a collision repair shop that includes the following: office area, metal work area, paint area, preparation area, drying area, makes ready area, and the parts and storage areas.

NATEF Standards Category:

Mechanical and Electrical Components

ASE Technical Area:

Mechanical and Electrical Components

Content Area(s):

Restraint Systems

Cooling Systems

Heating and Air Conditioning

Course Number and Name: **ABT 1453** **Mechanical and Electrical Components II**

Description: A continuation of Mechanical and Electrical Components I. A course designed to provide theory and practice in the areas of brakes and electrical.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	3	0	45
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explore brake principles and practices.
 - a. Inspect brake lines, hoses, and fittings for leaks, dents, kinks, rust, cracks, or wear; tighten fittings and supports; replace brake lines (double flare and ISO types), hoses, fittings, seals, and supports.
 - b. Identify, handle, store, and install appropriate brake fluids; dispose of in accordance with federal, state, and local regulations.
 - c. Bleed (manual, pressure, vacuum or surge) hydraulic brake system.
 - d. Pressure test brake hydraulic system; determine needed repair.
 - e. Adjust brake shoes; remove and reinstall brake drums or drum/hub assemblies and wheel bearings.
 - f. Remove, clean, inspect and reinstall caliper assembly and mountings for wear and damage; reinstall.
 - g. Check parking brake system operation.
 - h. Identify the proper procedures for handling brake dust.
 - i. Check for bent or damaged brake system components.
 - j. Demonstrate an understanding of various types of advanced braking systems (ABS, hydraulic, electronic, traction control).
2. Explore electrical principles and practices.
 - a. Check for available voltage, voltage drop and/or current in electrical wiring circuits and components with a DMM (digital multi-meter).
 - b. Repair electrical circuits, wiring, and connectors.
 - c. Inspect, test, and replace circuit breakers, and fuses.
 - d. Perform battery state-of-charge test; and slow/fast battery charge.
 - e. Inspect, clean, repair or replace battery, battery cables, connectors and clamps.
 - f. Dispose of batteries and battery acid according to local, state, and federal requirements.
 - g. Identify programmable electrical/electronic components and check for malfunction indicator lamp; record data for reprogramming before disconnecting battery.
 - h. Inspect alignment, adjust, remove, and replace alternator (generator), drive belts, pulleys, and fans.
 - i. Check operation and aim headlamp assemblies and fog/driving lamps; determine needed repairs.
 - j. Inspect, test, and repair or replace switches, relays, bulbs, sockets, connectors, and wires of interior and exterior light circuits.
 - k. Remove and replace horn(s); check operation.
 - l. Check operation of wiper/washer systems; determine needed repairs.
 - m. Check operation of power side and tailgate window; determine needed repairs.
 - n. Inspect, remove, and replace power seat, motors, linkages, cables, etc.
 - o. Inspect, remove, and replace components of electric door and hatch/trunk lock.

- p. Inspect, remove, and replace components of keyless lock/unlock devices and alarm systems.
- q. Check operation of electrically heated mirrors, windshields, back lights, panels, etc.; determine needed repairs.
- r. Demonstrate the proper self-grounding procedures for handling electronic components.
- s. Check for module communication errors using a scan tool.
- t. Use wiring diagrams and diagnostic flow charts during diagnosis of electrical circuit problems.
- u. Demonstrate safe disarming techniques of high voltage systems on hybrid vehicles.
- v. Identify potential safety and environmental concerns associated with hybrid vehicle systems.

NATEF Standards Category:

Mechanical and Electrical Components

ASE Technical Area:

Mechanical and Electrical Components

Content Area(s):

Brakes

Electrical

Course Number and Name: **ABT 1153** **Structural Analysis and Damage Repair II**

Description: This course is a continuation of Structural Analysis and Damage Repair I. This course provides instruction and practice in unibody inspection, measurement, and repair.

Hour Breakdown:	Semester Credit Hours	Lecture	Lab	Contact Hours
	3	2	2	60

Prerequisite: Instructor Approved

Instructor Note: For all the following tasks, recognize that measuring, dimensioning, and tolerance limits in unibody vehicles are critical to repair of these vehicles; recognize that suspension/steering mounting points and engine power train attaching points are critical to vehicle safety, handling, and performance.

Student Learning Outcomes:

1. Explore unibody inspection, measurement, diagnosis, and repair.
 - a. Analyze and identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and chassis alignment problems.
 - b. Realign or replace misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and chassis alignment problems.
 - c. Measure and diagnose unibody damage using tram and gauges.
 - d. Determine and inspect the locations of all suspension, steering, and powertrain component attaching points on the vehicle.
 - e. Measure and diagnose unibody vehicles using a dedicated (fixture) measuring system.
 - f. Diagnose and measure unibody vehicles using a three-dimensional measuring system (mechanical, electronic, and laser).
 - g. Determine the extent of the direct and indirect damage and the direction of impact; plan and document the methods and sequence of repair.
 - h. Attach anchoring devices to vehicle; remove or reposition components as necessary.
 - i. Identify cowl assembly.
 - j. Identify roof rails/headers and roof panels.
 - k. Identify hinge and lock pillars.
 - l. Identify vehicle openings, floor pans, and rocker panels.
 - m. Identify quarter panels, wheelhouse assemblies, and rear body sections (including rails and suspension/powertrain mounting points).
 - n. Identify, straighten and align front-end sections (aprons, strut towers, upper and lower rails, steering, and suspension/power train mounting points, etc.).
 - o. Identify substrate and repair or replacement recommendations.
 - p. Identify proper cold stress relief methods.
 - q. Repair damage using power tools and hand tools to restore proper contours and dimensions.
 - r. Remove and replace damaged sections of structural steel body panels.
 - s. Restore corrosion protection to repaired or replaced unibody structural areas.
 - t. Determine the extent of damage to aluminum structural components; repair, weld, or replace.
 - u. Analyze and identify crush/collapse zones.
 - v. Restore mounting and anchoring locations.

NATEF Standards Category:

Structural Analysis and Damage Repair
Damage Analysis, Estimating and Customer Service

ASE Technical Area:

Structural Analysis and Damage Repair

Content Area(s):

Unibody Inspection, Measurement and Repair

Course Number and Name: **ABT 2163** **Structural Analysis and Damage Repair III**

Description: This course is a continuation of Structural Analysis and Damage Repair II. This course provides the procedures and practices for frame inspection and repair.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explore frame inspection diagnosis and repair.
 - a. Measure and diagnose structural damage using a tram and gauges.
 - b. Attach vehicle to anchoring devices.
 - c. Identify, analyze, and measure mash (collapse) damage.
 - d. Identify, analyze, and measure sag damage.
 - e. Identify, analyze, and measure side-sway damage.
 - f. Identify, analyze, and measure twist damage.
 - g. Identify, analyze, and measure diamond frame damage.
 - h. Remove and replace damaged structural components.
 - i. Restore corrosion protection to repaired or replaced frame areas.
 - j. Analyze and identify misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and wheel alignment problems.
 - k. Align or replace misaligned or damaged steering, suspension, and powertrain components that can cause vibration, steering, and wheel alignment problems.
 - l. Identify heat limitations for structural components.
 - m. Restore structural foam.
 - n. Diagnose and measure structural damage using a universal measuring system (mechanical, electrical, laser).
 - o. Diagnose and measure structural damage to vehicles using a dedicated (fixture) measuring system.
 - p. Determine the extent of the direct and indirect damage and the direction of impact; document the methods and sequence of repair.
 - q. Analyze and identify crush/collapse zones.

NATEF Standards Category:

Structural Analysis and Damage Repair
Damage Analysis, Estimating and Customer Service

ASE Technical Area:

Structural Analysis and Damage Repair

Content Area(s):

Frame Inspection and Repair

Course Number and Name: **ABT 2243 Non-Structural Analysis and Damage Repair III**

Description: This course is a continuation of Non-Structural Analysis and Damage Repair II.
This course provides instruction and practice for the following areas: moveable glass, hardware associated with glass, plastics and adhesive.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explore and apply moveable glass and hardware principles and practices.
 - a. Inspect, adjust, and repair/replace window regulators, run channels, glass, power mechanisms, and related controls.
 - b. Inspect, adjust, repair, remove, reinstall, or replace weather-stripping.
 - c. Identify removable, power operated roof panel and hinges, latches, guides, handles, retainer, and controls of sunroofs.
 - d. Identify and discuss convertible top and related mechanisms.
2. Explore and apply plastics and adhesive principles and practices.
 - a. Identify the types of plastics; determine repair-ability.
 - b. Clean and prepare the surface of plastic parts; identify the types of plastic repair procedures.
 - c. Repair rigid, semi-rigid, or flexible plastic panels.
 - d. Remove or repair damaged areas from rigid exterior composite panels.
 - e. Replace bonded rigid exterior composite body panels; straighten or align panel supports.

NATEF Standards Category:

Non-Structural Analysis and Damage Repair (Body Components)

ASE Technical Area:

Non-Structural Analysis and Damage Repair

Content Area(s):

Moveable glass and Hardware

Course Number and Name: **ABT 2336 Refinishing III**

Description: A continuation of Refinishing II with emphasis on advanced painting techniques including paint mixing, matching, and applying and detailing.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
6	2	8	150

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explore paint (mixing, matching, and applying) procedures and practices.
 - a. Identify type and color code by manufacturer's vehicle information label.
 - b. Shake, stir, reduce, catalyze/activate, and strain refinish materials.
 - c. Apply finish using appropriate spray techniques (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap) for the finish being applied.
 - d. Apply selected product on test and let-down panel; check for color match.
 - e. Apply basecoat/clearcoat for panel blending or panel refinishing.
 - f. Apply basecoat/clearcoat for overall refinishing.
 - g. Remove nibs or imperfections from basecoat.
 - h. Refinish rigid, or semi-rigid, and plastic parts.
 - i. Refinish flexible plastic parts.
 - j. Apply multi-stage coats for panel blending or overall refinishing.
 - k. Identify and mix paint using a formula according to a given formula.
 - l. Identify poor hiding colors; determine necessary action.
 - m. Tint color using formula to achieve a blendable match.
 - n. Identify alternative color formula to achieve a blendable match.
2. Explore final detail procedures and practices.
 - a. Apply decals, transfers, tapes, pinstripes (painted and taped), etc.
 - b. Buff and polish finish removing defects as required.
 - c. Clean interior, exterior, and glass.
 - d. Clean body openings (door jambs and edges, etc.).
 - e. Remove overspray.Perform pre-delivery detail and inspection.

NATEF Standards Category:

Painting and Refinishing

ASE Technical Area:

Painting and Refinishing

Content Area(s):

Paint Mixing, Matching, and Applying

Final Detail

Course Number and Name: **ABT 2713 Collision Analysis and Estimation**

Description: This course covers the complete inspection and analysis of damaged vehicles. It is designed to enable the student to determine the conditions and severity of the damage, the repair or replacement of parts, the estimated repair time, and correct use of reference manuals.

Hour Breakdown:	Semester Credit Hours	Lecture	Lab	Contact Hours
	3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explain procedures for use of collision and reference manuals.
 - a. Demonstrate the use of repair manuals and estimating systems crash books, parts books, and flat rate manuals, including computerized systems.
 - b. Discuss legal aspects of body repair.
2. Explain practices for analyzing damage and estimating repair procedures utilizing manual and computerized systems.
 - a. Discuss factors to consider in determining whether to replace or repair a part.
 - b. Estimate time required for repair or replacement of parts.
 - c. Prepare estimates for various body repair jobs.
 - d. Discuss factors to consider in determining whether to repair or "total" a vehicle.

Course Number and Name: **ABT 2813 Shop Operations and Procedures**

Description: An introduction to small business management techniques as applied to the collision repair shop includes computerized information and record systems. Also included are financial responsibilities, shop layout, inventory, and employee-employer relations.

Hour Breakdown:	Semester Credit Hours	Lecture	Lab	Contact Hours
	3	2	2	60

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Explain procedures for the operation of a collision repair business.
 - a. Describe the operation of a small business.
 - b. Describe financial records required by small businesses.
 - c. Complete forms and records used in automotive body repair using computer equipment and software.
 - d. Describe procedures and forms for taking and maintaining an inventory.
 - e. Describe practices for maintaining good employer/employee relationships.
 - f. Describe legal responsibilities of a collision repair shop owner.
2. Explain layout of a collision repair shop.
 - a. Describe location of office area.
 - b. Describe metal work.
 - c. Describe paint area.
 - d. Describe preparation area.
 - e. Describe drying area.
 - f. Describe the make ready area.
 - g. Describe parts and storage areas.

Course Number and Name: **ABT 291(1-3) Special Problem in Collision Repair Technology**

Description: A course to provide students with an opportunity to utilize skills and knowledge gained in other Collision Repair Technology courses. The instructor and student work closely together to select a topic and establish criteria for completion of the project.

Hour Breakdown:

Semester Credit Hours	Lecture	Lab	Contact Hours
1	0	2	30
2	0	4	60
3	0	6	90

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Develop a written plan that details the activities and projects to be completed.
 - a. Use a written plan that details the activities and projects to be completed.
 - b. Perform written occupational objectives in the special problem.
2. Assess accomplishment of objectives.
 - a. Prepare daily written assessments of accomplishment of objectives.
 - b. Present weekly written reports to the instructor of activities performed and objectives accomplished.
3. Use and follow a set of written guidelines for the special problem.
 - a. Develop and follow a set of written guidelines for the special problem.

Course Number and Name: **ABT 292(1-6) Supervised Work Experience in Collision Repair Technology**

Description: A course that is a cooperative program between industry and education designed to integrate the student's technical studies with industrial experience. Variable credit is awarded on the basis of one semester hour per 45 industrial contact hours.

Hour Breakdown:

Semester Credit Hours	Lecture	Externship	Contact Hours
1	0	3	45
2	0	6	90
3	0	9	135
4	0	12	180
5	0	15	225
6	0	18	270

Prerequisite: Instructor Approved

Student Learning Outcomes:

1. Follow a set of instructor-written guidelines for the supervised work experience program.
2. Apply skills needed to be a viable member of the workforce.
 - a. Prepare a description of skills to be developed in the supervised work experience program.
 - b. Practice skills needed to be a viable member of the workforce.
3. Practice human relationship skills in the supervised work experience program.
4. Practice positive work habits, responsibilities, and ethics.
5. Develop written occupational objectives in the supervised work experience program.
6. Assess performance of occupational skills.
 - a. Prepare daily written assessments of work performance as specified in the occupational objectives.
 - b. Present weekly written reports to the instructor of activities performed and objectives accomplished.

RECOMMENDED TOOLS AND EQUIPMENT

Capitalized Items

1. Any tools or equipment that are needed to meet NATEF certification or are on the NATEF tool list
2. Automotive paint mixing system with all materials, accessories, and paint shaker (1)
3. Booth, down draft heated paint (1)
4. Cleaner, high pressure (1)
5. Computer with operating software with multimedia kit (5)
6. Gauge set of 4, center line (1)
7. Gun, spray (gravity feed) (4)
8. Gun, battery powered caulking with three extra batteries (2)
9. Headlight set, aiming (1)
10. Jack, body and fender, portor power with attachments (10 ton) (1)
11. Jack, body and fender portor power with attachments (4 ton) (1)
12. Knife, equalizer (1)
13. Lift, 2 post, 9,000 pound above ground (2)
14. Paint mixing room (Separate explosion-proof room per NFPA regulations) (1)
15. Plasma arc cutting equipment with all attachments (1)
16. Rack, frame with measuring equipment (1)
17. Recovery system, air conditioning with all attachments (R12)/(134A) (1)
18. Regulator, air with extractors (12)
19. Respirator, fresh air supply completely hooded (4 man system) (1)
20. Scantool, universal with accessories(1)
21. Studless dent puller with accessories 220 volt (1)
22. Welder, spot (STRSW resistance welder) (1)
23. Welder, GMAW (115V) (135 A) with all attachments (2)
24. Welder, GMAW (220V) (225 A) with all attachments(1)
25. Welder, GMAW Aluminum capabilities (220 V) (225 A) with all attachments(1)

Non-Capitalized Items

1. Any tools or equipment that are needed to meet NATEF certification or are on the NATEF tool list
2. Battery booster box (1)
3. Bench, steel work (6)
4. Blade, razor scraper (5)
5. Block, sanding short (6)
6. Block, sanding long (6)
7. Board, file (6)
8. Brush, striping (6)
9. Brush, wire (20)
10. Cables, jumper (1)
11. Camera, digital (1)
12. Chains, bumper alignment hooks (2)
13. Charger, battery 120 A (1)
14. Chisel set, 15 piece assorted metal (1)
15. Chuck, air (30 sets)
16. Clamp, welder (locking pliers) (6)
17. Clamp, sheet metal (locking pliers) (6)
18. Clamp set, assorted body (2)
19. Clamp, C-clamp (locking pliers) (3 in.) (2)
20. Clamp, C-clamp (locking pliers) (7 in.) (2)
21. Clamp, C-clamp (locking pliers) (11 in.) (2)
22. Clamp, C-clamp (locking pliers) (18 in.) (2)
23. Cleaner, vacuum (1)

24. Come-along (2 ton) (2)
25. Cord, extension (50 ft) (4)
26. Cover, fender (4)
27. Cover, wheel (set of 4) (4)
28. Cup, viscosity (#2 Zahn) (2)
29. Cutter, sheet metal, hand (2)
30. Cutter, sheet metal, power (1)
31. Cutter set, panel (air drive) (1)
32. Cutter, disc grinder (2)
33. Dollies set, assorted (4)
34. Drill, electric (1/2 in.) (1)
35. Drill, pneumatic (1/2 in.) (1)
36. Drill set, 20 piece drill index cobalt tipped (2)
37. Drill, pneumatic (3/8 in.) (2)
38. Driver, hand impact (3/8-in. drive) (3)
39. Dryer, infrared paint 4 bulb (4)
40. Ear muffs for sound protection applicable to a collision repair setting (6)
41. Extractor set, screw (Easy Out) (1)
42. Face shield (4)
43. File, air (orbital or straight line) (6)
44. File, body round (2)
45. File, body flat (2)
46. Flashlight (2)
47. Gauge, tram (1)
48. Gloves, cutting goggles (4)
49. Gloves, pair welding (4)
50. Gloves, lineman (2)
51. Gloves, nitrile (6)
52. Goggles, safety (6)
53. Grater, ½ round cheese (24)
54. Grinder, 1 horse power bench (1)
55. Gun, air dusting (4)
56. Gun, spray assorted (6)
57. Gun, heat (1)
58. Gun, staple (1)
59. Hacksaw (2)
60. Hammer, machinist (4)
61. Hammer set, body (4)
62. Hammer, slide large (snatch bar) (2)
63. Hammer, slide small (snatch bar) (2)
64. Hammer, sledge (1)
65. Helmet, digital/auto darkening welding (4)
66. Hoist, chain or pneumatic (2 T) (1)
67. Hose, air with quick couplings (50 ft) (20)
68. Jack, floor with casters (2 T) (4)
69. Jack, mechanical (1)
70. Jack, twin saddle (1)
71. Jigsaw, (2)
72. Jitterbug, orbital (4)
73. Knife, cold (1)
74. Knife, putty (1½ in.) (2)
75. Knife, putty (3 in.) (8)
76. Knife, putty (2 in.) (2)

77. Knife, windshield wiggle (pneumatic) (1)
78. Large cabinet (3)
79. Light, extension (3)
80. Machine, masking (2)
81. Mallet, rubber (2)
82. Mallet, plastic (1)
83. Mask, particle (4 boxes)
84. Pan, drain (2)
85. Picks, set of assorted (2)
86. Pliers, hog ring (1)
87. Pliers set, assorted (3)
88. Pliers, vise grip (10)
89. Polisher, power (variable speed up to 2,000 rpm) (2)
90. Printer, color (5)
91. Punch set, metal assorted (1)
92. Rack, stand (bumper and hood) (5)
93. Repair kit, windshield (1)
94. Sander, dual action (6 in.) (10)
95. Sander/Grinder, automotive disc electric (2)
96. Sander, dual action (8 in.) (2)
97. Sander/Grinder, automotive disc pneumatic (2)
98. Saw set, hole assorted (1)
99. Saw, reciprocating (1)
100. Screwdriver set, Phillips (#1,2,3,4) (4)
101. Screwdriver set, Torx (#5-55) (2)
102. Screwdriver set, clutch (1)
103. Screwdriver set, flat blade (6)
104. Scribe, (scratch awl) (4)
105. Shaker, paint (1)
106. Sockets, metric and standard (1/4 in., 3/8 in., and 1/2 in. drive) (2)
107. Sockets impact -metric and standard (1/2 in. drive) (2)
108. Soldering kit (gun or iron) (1)
109. Spoons, assorted (1)
110. Stands, adjustable (20)
111. Studgun dent puller with accessories (4)
112. Strap, fender pull (2)
113. Tap and die set, standard (1)
114. Tap and die set, metric (1)
115. Tape, steel (25 ft) (2)
116. Tester, circuit load (1)
117. Tester, multimeter (VOM) (2)
118. Tester, radiator pressure (1)
119. Tool, door handle clip remover kit (2)
120. Tool, door handle pin removing (1)
121. Tool, pop rivet, large (2)
122. Tool, pop rivet, small (2)
123. Tool, magnetic pickup (2)
124. Torx driver set (1/4 in. and 3/8 in. drive #5-55) (2)
125. Tubing set, double flaring tool (1)
126. Vise, table (5 in.) (4)
127. Welder, plastic with attachments (2)
128. Welder set, oxyacetylene with cutting torch and accessories (1)
129. Wrench set, combination metric (5mm - 21mm) (2)

130. Wrench, pneumatic ratchet (1/4 in. drive) (4)
131. Wrench, pneumatic ratchet (3/8 in. drive) (4)
132. Wrench, pneumatic impact (3/8 in. butterfly) (4)
133. Wrench, pneumatic impact (1/2 in.) (4)
134. Wrench set, box end (3/16 in. to 1¼ in.) (1)
135. Wrench, pneumatic impact 3/8 in. standard (1)
136. Wrench set, Allen (standard and metric) (2)
137. Wrench set, combination SAE (3/16 in. - 1¼ in.) (4)

* Additional equipment may be needed as certification requirements change.

RECOMMENDED INSTRUCTIONAL AIDS

It is recommended that instructors have access to the following items:

1. Online data access (Alldata, Mitchell, Motor)
2. Cart, AV (for TV-DVD) (1)
3. Cart, AV (for overhead projector) (1)
4. Mylar board (1)
5. Internet connection (1)
6. TV (Flat Screen)
7. DVD (1)
8. Video out (Microcomputer to TV monitor) (1)
9. Smart board
10. Laptop computer
11. Digital camera (1)
12. Microcomputer with monitor, printer (CD-ROM and cables) (Instructor use)
13. Light box projector (1 per program)

CURRICULUM DEFINITIONS AND TERMS

- Course Name – A common name that will be used by all community colleges in reporting students
- Course Abbreviation – A common abbreviation that will be used by all community and junior colleges in reporting students
- Classification – Courses may be classified as the following:
 - Career Certificate Required Course – A required course for all students completing a career certificate.
 - Technical Certificate Required Course – A required course for all students completing a technical certificate.
 - Technical Elective – Elective courses that are available for colleges to offer to students.
- Description – A short narrative that includes the major purpose(s) of the course
- Prerequisites – A listing of any courses that must be taken prior to or on enrollment in the course
- Corequisites – A listing of courses that may be taken while enrolled in the course
- Student Learning Outcomes – A listing of the student outcomes (major concepts and performances) that will enable students to demonstrate mastery of these competencies

The following guidelines were used in developing the program(s) in this document and should be considered in compiling and revising course syllabi and daily lesson plans at the local level:

- The content of the courses in this document reflects approximately 75% of the time allocated to each course. The remaining 25% of each course should be developed at the local district level and may reflect the following:
 - Additional competencies and objectives within the course related to topics not found in the state framework, including activities related to specific needs of industries in the community college district
 - Activities that develop a higher level of mastery on the existing competencies and suggested objectives
 - Activities and instruction related to new technologies and concepts that were not prevalent at the time the current framework was developed or revised
 - Activities that include integration of academic and career–technical skills and course work, school-to-work transition activities, and articulation of secondary and postsecondary career–technical programs
 - Individualized learning activities, including work-site learning activities, to better prepare individuals in the courses for their chosen occupational areas
- Sequencing of the course within a program is left to the discretion of the local college. Naturally, foundation courses related to topics such as safety, tool and equipment usage, and other fundamental skills should be taught first. Other courses related to specific skill areas and related academics, however, may be sequenced to take advantage of seasonal and climatic conditions, resources located outside of the school, and other factors. Programs that offer an Associate of Applied Science Degree must include all of the required Career Certificate courses, Technical Certificate courses **AND** a minimum of 15 semester hours of General Education Core Courses. The courses in the General Education Core may be spaced out over the entire length of the program so that students complete some academic and Career Technical courses each semester. Each community college specifies the actual courses that are required to meet the General Education Core Requirements for the Associate of Applied Science Degree at their college.

- In order to provide flexibility within the districts, individual courses within a framework may be customized by doing the following:
 - Adding new student learning outcomes to complement the existing competencies and suggested objectives in the program framework
 - Revising or extending the student learning outcomes
 - Adjusting the semester credit hours of a course to be up 1 hour or down 1 hour (after informing the Mississippi Community College Board [MCCB] of the change)

Course Crosswalk Collision Repair Technology (CIP: 47.0606)					
<i>Note: Courses that have been added or changed in the 2017 curriculum are highlighted.</i>					
Existing			Revised		
2011 MS Curriculum Framework			2017 MS Curriculum Framework		
Course Number	Course Title	Hours	Course Number	Course Title	Hours
ABT 1143	Structural Analysis and Damage Repair I	3	ABT 1146	Structural Analysis and Damage Repair I	6
ABT 1153	Structural Analysis and Damage Repair II	3	ABT 1153	Structural Analysis and Damage Repair II	3
ABT 1213	Collision Welding and Cutting	3		<i>Deleted</i>	
ABT 1223	Non-Structural Analysis and Damage Repair I	3	ABT 1223	Non-Structural Analysis and Damage Repair I	3
ABT 1233	Non-Structural Analysis and Damage Repair II	3	ABT 1236	Non-Structural Analysis and Damage Repair II	6
ABT 1313	Refinishing I	3	ABT 1313	Refinishing I	3
ABT 1323	Refinishing II	3	ABT 1323	Refinishing II	3
ABT 1443	Mechanical and Electrical Components I	3	ABT 1443	Mechanical and Electrical Components I	3
ABT 1453	Mechanical and Electrical Components II	3	ABT 1453	Mechanical and Electrical Components II	3
ABT 2163	Structural Analysis and Damage Repair III	3	ABT 2163	Structural Analysis and Damage Repair III	3
ABT 2173	Structural Analysis and Damage Repair IV	3		<i>Deleted</i>	
ABT 2243	Non-Structural Analysis and Damage Repair III	3	ABT 2243	Non-Structural Analysis and Damage Repair III	3
ABT 2253	Non-Structural Analysis and Damage Repair IV	3		<i>Deleted</i>	
ABT 2333	Refinishing III	3	ABT 2336	Refinishing III	6
ABT 2343	Refinishing IV	3		<i>Deleted</i>	
			ABT 2713	Collision Analysis and Estimation	3
			ABT 2813	Shop Operations and Procedures	3
ABT 291(1-3)	Special Problem in Collision Repair Technology	1-3	ABT 291(1-3)	Special Problem in Collision Repair Technology	1-3
ABT 292(1-6)	Supervised Work Experience in Collision Repair Technology	1-6	ABT 292(1-6)	Supervised Work Experience in Collision Repair Technology	1-6