CENTRAL TEXAS COLLEGE
INDUSTRIAL TECHNOLOGY DEPARTMENT
SYLLABUS FOR ABDR 1419
BASIC METAL REPAIR

Semester Hours Credit: 4
Contact Hours: 144

INSTRUCTOR: ______________

OFFICE HOURS: __________

I  INTRODUCTION

A. In depth coverage of basic metal principles and working techniques including proper tool usage and producer application.

B. Basic Metal Repair (ABDR 1419) is a required course for the completion of a two year Associate of Applied Science degree in Auto Collision Repair or a Level I or Level II certificate of completion in the Auto Collision Repair Technician Program.

C. This course is occupationally related and serves as a preparation for a career in the Auto Collision Repair field.

D. Prerequisites: This course has a prerequisite or co-requisite of ABDR 1472 and 1471 or consent of the Department Chair.

E. Alphanumeric coding used throughout this module book denotes integration of SCANS occupational competencies (C1, etc.) and Foundation skills (F1, etc.).

II  LEARNING OUTCOMES

Upon successful completion of this course, Basic Metal Repair, the student will:

A. The student will perform basic metal straightening procedures. (C18, 19) (F9)

B. Utilize basic body shop hand tools. (C18, 19)

C. Utilize appropriate plastic filler applications and techniques. (C18, 19)

D. Comply with personal and environmental safety practices associated with clothing, eye protection, and use of chemicals, hand tools, and power equipment. (C18, 19) (F1)

January 10, 2007
E. Describe the role and basic provisions of OSHA, The Hazardous Communications Act, and the use of MSDS. (F1)

F. Use basic shop math to add, subtract, multiply and divide whole numbers, fractions, decimals and percentages. (C18, 19)

G. Use both Metric and U.S. Customary measurements in auto collision repair applications. (F3)

H. Correctly and safely use pneumatic and electric power tools. (C18, 19)

I. Identify and properly use related special tools. (C18, 19)

J. Identify, describe and select the proper type of abrasive for specific repair operations. (C18, 19)

K. Identify, describe and properly apply body sealers. (C18, 19)

L. Describe the composition and properties of the basic materials used in auto body construction and their relationship to production and general repair procedures. (C18, 19)

M. Recognize body/frame types in terms of function, design configuration and manner of construction. (C15)

N. Identify and describe the major body components, assemblies, fasteners and assembly methods. (C15)

O. Identify and explain the use of various types of fire extinguishers. (C18)

P. Name the classes of fires and explain them. (C18)

Q. Discuss first aid. (C6) (F7)

III INSTRUCTIONAL MATERIALS

A. Text:
The instructional materials identified for this course are viewable through www.cted.edu/books
B. Supplemental Reading:

3. Others as selected by the instructor

C. References: As selected by the instructor.

D. Audio Visual Aids: (Recommended)

1. “Hazardous Communication Training Program”, Helm Inc. (13 lessons) (Video)
2. “The Safety Factor”, Circle Oak Production. (Video)
3. “Auto Body Shop Safety”, (Filmstrip)
5. “Welding Equipment Safety and Operation”, Shopware Educational Systems #SW200S
9. “U.S., Customary Units of Measurement”, Basic College Mathematics DSMA 0300 Chapter 8 (Computer Aided Training)
11. “Hand Tool Safety-Parts 1& 2”, Abraxis Film #s 1A2 & 1A3 (Filmstrip)

E. Other instructional material: As selected by the instructor.

IV COURSE REQUIREMENTS

A. Your first responsibility is scholarship. The grade you receive will be the result of your efforts both in the classroom and in the laboratory.

B. This course is designed to require a steady, continuous effort form the student. Class participation, initiative, attendance and work efforts will be considered in grade computation.
C. Reading and study assignments will be made by the instructor. Reading of all study assignments is required, as well as specific tasks outlined by the instructor or listed on handouts, or laboratory activity sheets. Specific reading assignments will be assigned by the instructor. Students are required to complete these assignments by the time specified by the instructor.

Quizzes may be given on any or all reading assignments.

D. The study of a subject is not limited to the classroom, laboratory, or limits of the syllabus. Each student should seek out and study all available material available on the subject being taught. This might include use of the Internet or the library. In general, two hours of study outside the regular class period is recommended for each hour of classroom work.

E. Students are required to attend class and laboratory sessions regularly. Those who fail to do so may be dropped from the course with a grade of “FN”.

F. Students are required to be present for all examinations. See paragraph V (Examinations) for additional information.

G. Laboratory learning activities (lab tasks) will be completed on an individual basis except when limited by tools and/or materials. Learning activities will be subjectively graded by the instructor. Students assigned to a group must be present at all times when the project is being worked on. Students who are not present while a learning activity is in progress may be given a “0” for that activity. Students are required to complete all laboratory assignments by the time specified by the instructor.

V EXAMINATIONS

A. There will be a minimum of three major examinations:

1. Three Week Exam

2. Mid Term Exam

3. Final Exam (this is a comprehensive exam)

4. Additional examinations may be given if the instructor determines it is necessary for proper evaluation of the students in the class.

B. Students must be present for all examinations. Make up examinations will not be given. Students who know they will be absent on the day of an examination must make arrangements with the instructor prior to the absence. Students who are absent on the day of the examination due to illness or other extenuating circumstances will be given a make up examination when it is convenient for them.
circumstances must present to the instructor an acceptable reason for the absence on the day following the absence.

C. Students without an excused absence will be given a zero for that examination.

D. Students must take the final examination to receive a grade for the course.

VI SEMESTER GRADE COMPUTATIONS

A. Written examinations will count 45% of the student’s overall final grade.

B. Practical, hands-on lab work will count 45% of the student’s overall final grade.

C. Incentive points will count 10% of the student’s overall final grade. Incentive points are earned by doing additional work, written assignments, class participation, demonstrated initiative and positive attitude. Points will be deducted for each unexcused absence, each written assignment not turned in, each tardiness and each failure to secure tools and clean work areas.

D. Grade Computations (Example)

1. Written Exams (45%) (maximum 100 points)
   1st Exam 90
   2nd Exam 90
   3rd Exam +90
   270 divided by 3 = 90 average

2. Lab score (45%) (maximum 100 points)
   Lab score = 80
   45% of 80 = 36 points for lab score

3. Incentive Score (10%) (maximum 100 points)
   Incentive score = 82
   10% of 82 = 8.2 points for Incentive Score

4. Final Overall Grade Computation
   Written Exam 40.5 Points
   Lab Score 36.0 Points
   Incentive Score 8.2 Points
   84.7 Total Points = a letter grade of “B”
E. Points/Score Equivalents:

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VII NOTES AND ADDITIONAL INSTRUCTIONS FROM THE INSTRUCTOR

A. Course Withdrawal: It is the student’s responsibility to officially withdraw from a course if circumstances prevent attendance. Any student who desires to, or must, officially withdraw from a course after the first scheduled class meeting must file a Central Texas College Application for Withdrawal (CTC Form 59). The withdrawal form must be signed by the student.

CTC Form 59 will be accepted at any time prior to Friday of the 12th week of classes during the 16-week fall and spring semester. The deadline for sessions of others lengths is:

- 10-week session  Friday of the 8th week
- 8-week session   Friday of the 6th week
- 5-week session   Friday of the 4th week

The equivalent date (75% of the semester) will be sued for session of other lengths. The specific last day to withdraw is published each semester in the Schedule Bulletin.

A student who officially withdraws will be awarded the grade of “W” provided the student’s attendance and academic performance are satisfactory at the time of official withdrawal. Students must file a withdrawal application with the College before they may be considered for withdrawal.

A student may not withdraw from a class for which the instructor has previously issued the student a grade of “F” or “FN” for nonattendance.

B. Administrative Withdrawal: An administrative withdrawal may be initiated when the student fails to meet College attendance requirements. The instructor will assign the appropriate grade on CTC Form 59 for submission to the registrar.

C. Incomplete Grade: The College catalog states, “An incomplete grade (‘IP’) may be given in those cases where the student has completed the majority of the course
work but, because of personal illness, death in the immediate family, or military orders, the student is unable to complete the requirements for a course...” Prior approval from the instructor is required before the grade of “IP” for Incomplete is recorded. A student who merely fails to show for the final examination will receive a zero for the final and an “F” for the course.

D. Cellular Phones and Beepers: Cellular phones and beepers will be turned off while the student is in the classroom or laboratory.

E. American’s With Disabilities Act (ADA): Disability Support Services provide services to students who have appropriate documentation of a disability. Students requiring accommodations for class are responsible for contacting the Office of Disability Support Services (DSS) located on the central campus. This service is available to all students, regardless of location. Explore the website at www.ctcd.edu/disability-support for further information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.

F. Instructor Discretion: The instructor reserves the right of final decision in course requirements.

G. Civility: Individuals are expected to be cognizant of what a constructive educational experience is and respectful of those participating in a learning environment. Failure to do so can result in disciplinary action up to and including expulsion.

H. Absence from the class may be unavoidable in some situations. These include illness, military/civilian job requirements, or a death in the immediate family. Documentation is required in the case of excused absences for job requirement’s, excuses will be on company letterhead stationary signed by the immediate supervisor stating the reason for the absence for civilian jobs. Excuses for military personnel must be signed by the 1st Sergeant or the Company Commander. In cases of illness, one day absences may be excused on a statement from the individual stating the reason. For more than one day of illness, the individual must have a statement from the doctor treating the illness.

VIII COURSE OUTLINE

A. Lesson One: Auto Collision Repair Shop Safety

1. Learning Outcomes: Upon successful completion of this lesson, the student will:
a. Comply with personal and environmental safety practices associated with clothing, eye protection, and use of chemicals, hand tools, and power equipment. (C18, 19)(F1)
b. Describe the role and basic provisions of OSHA, The Hazardous Communications Act, and the use of MSDS. (F1)
c. Identify and explain the use of various types of fire extinguishers. (C18)
d. Name the classes of fires and explain them. (C18)
e. Discuss first aid. (C6) (F7)

2. Learning Activities:

a. The student will complete reading assignments as assigned. (F1, F11, C5, C6)
b. The student will study the words/terms and complete written assignments specified by the instructor. (F1, F11, C5, C6)
c. The student will attend classroom lectures and participate in classroom discussion. (F5 thru 7, F9, F10, C1, C5 thru 7)
d. The student will observe demonstrations performed by the instructor. (F5, F10, C5, C6, C14)
e. The student will complete laboratory learning activities assigned by the instructor. See the laboratory learning activity list attached. (F1 thru F17, C1, C3, C5 thru 9, C14 thru 16, C18 thru 20)

3. Equipment and Materials:

a. Safety Glasses, goggles, face shields
b. Examples/illustrations of protective clothing
c. Respirators: Non-toxic and toxic dusts, paint fumes, welding fumes, etc.
d. Welding goggles and helmets
e. Protective gloves, leather and rubber
f. Fire extinguishers
g. Jacks and jack stands
h. TV/VCR (as required)
i. MSDS assortment
j. Others as required by the instructor.

4. Audio Visual Aids: (Recommended)

a. To be selected by the instructor from those listed in Section III D above.
b. Others as selected by the instructor.
5. **Lesson Outline**:

a. **Introduction**

b. **Personal Safety**
   1. clothing/jewelry
   2. eye/face protection
   3. hearing protection
   4. hand protection
   5. respiratory protection
   6. lifting practices
   7. emergency escape routes
   8. attitude toward safety
   9. horseplay

c. **Tool and Equipment Handling**
   1. hand/power tool condition and cleanliness
   2. shop cleanliness
   3. storage: tools, materials, parts
   4. work lanes and exits
   5. vehicle lifting/hoisting
   6. vehicle operation: in the shop
   7. welding precautions

d. **Fire/Explosion Safety**
   1. storage of flammables/explosives
   2. classes of fires
   3. requirements for extinguishing
   4. types of extinguishers
      a. specific uses
      b. operation
      c. locations of extinguishers
   5. Vehicle fuel tanks
      a. requirements for removal
      b. storage
   6. Vehicle batteries
      a. gasses produced
      b. explosion hazard
      c. charging/handling caution

e. **Hazardous Material and Chemicals**
   1. types
   2. protective measures
   3. symptoms of poisoning
   4. OSHA
   5. MSDS
B. **Lesson Two:** Auto Body Construction

1. **Learning Outcomes:** Upon successful completion of this lesson, the student will:

   a. Describe the composition and properties of the basic materials used in auto body construction and their relationship to production and general repair procedures. (C18, 19)
   b. Recognize body/frame types in terms of function, design configuration and manner of construction. (C15)
   c. Identify and describe the major body components, assemblies, fasteners and assembly methods. (C15)

2. **Learning Activities:**

   a. The student will complete reading assignments as assigned. (F1, F11, C5, C6)
   b. The student will study the words/terms and complete written assignments specified by the instructor. (F1, F11, C5, C6)
   c. The student will attend classroom lectures and participate in classroom discussion. (F5 thru 7, F9, F10, C1, C5 thru 7)
   d. The student will observe demonstrations performed by the instructor. (F5, F10, C5, C6, C14)
   e. The student will complete laboratory learning activities assigned by the instructor. See the laboratory learning activity list attached. (F1 thru F17, C1, C3, C5 thru 9, C14 thru 16, C18 thru 20)

3. **Equipment and Materials:**

   a. Vehicles representative of current body/frame construction methods (conventional and unitized).
   b. Hand tools
   c. Power tools
   d. Special tools
   e. Various sealers and adhesives common to auto body repair procedures.
   f. TV/VCR (as required)
   g. Others as selected by the instructor.

4. **Audio Visual Aids:** (Recommended)
a. To be selected by the instructor from those listed in Section III D above.

b. Others as selected by the instructor.

5. Lesson Outline:

a. Body Steel
   (1) Definition
   (2) Composition
      (a) high carbon
      (b) low carbon
      (c) HSS/HSLA
      (d) uses
      (e) early steel
   (3) Grain structures
   (4) Working properties
      (a) plasticity
      (b) elasticity
      (c) work-hardening
      (d) yield point
   (5) Panel manufacture
      (a) types required
      (b) effect of panel stamping
         i) work-hardening
         ii) residual stresses
   (6) Basic shapes and reinforcements
      (a) factors dictating shape
      (b) Classification of shapes
         i) crowns
            a) high/double crown
            b) low crown
            c) combination crown
            d) single crown
            e) reverse crown
            f) strength comparisons
               ii) reinforcements
                  a) flange
                  b) channel
                  c) beads
                  d) box
                     1) reinforced
                     2) partial
                  e) strength comparisons

b. Functions of the Frame
c. Evolution of Body/Frame Design
(1) overview of design changes
   (a) horseless carriage
   (b) model “T” era
   (c) pre-war
   (d) post-war
   (e) 60's-70's
   (f) present

(2) causes for change
   (a) road conditions
   (b) speeds
   (c) manufacturing technology
   (d) safety
   (e) fuel consumption

d. Basic Body/Frame Types
(1) conventional construction
   (a) ladder
   (b) X-type
   (c) perimeter
   (d) drop center
   (e) component construction and identification
      i) side rails
      ii) cross members
      iii) torque boxes
      iv) suspension mounts
      v) body mounts
   (f) strength comparisons

(2) unitized construction
   (a) total unitized
   (b) stub frame and body
   (c) location and use of HSS/HSLA
   (d) crush patterns
      i) crush zones
      ii) the windshields as a structure member
      iii) repair precautions
   (e) underbody component construction and identification
      i) radiator support
      ii) front rails
         a) upper
         b) lower
      iii) spring mounting panel/apron
      iv) side and cross member assembly/engine cradle
      v) cowl
vi) rocker panels
vii) floor panels
viii) package tray
ix) rear rails
x) correlations to conventional construction

(f) Body Construction: identification, construction, and methods of attachment
i) bumper assemblies
   a) types
   b) composition materials
   c) methods of attachment and adjustment
      1) types
      2) testing
      3) safety
         (i) handling
         (ii) welding
         (iii) disposal of

ii) front end assembly
   a) header panels
   b) grilles
   c) fenders and skirts
   d) filler panels and splash shields
   e) radiator support
      1) radiators
      2) air conditioner condensers
      3) hood latch and support
   f) hood
      1) hinge types
      2) support cylinders
         (i) construction
         (ii) safety: handling/disposal
      3) latch strikers
   g) lamp assemblies
      1) headlamps
      2) park/turn signals
      3) cornering
      4) side marker
      5) bulb types and locations
   h) under-hood wiring
      1) routes
      2) harness disconnects
      3) connectors
         i) standard
ii) weather pack
4) CCC system wiring repair
   i) procedures
   ii) precautions

iii) passenger compartment
   a) floor plan, dash, and instrument panels
   b) cowl assembly
   c) hinge, lock, and windshield pillars
   d) doors and hinges
   e) roof and rails

iv) rear body
   a) quarter panels
   b) wheelhouse panels
   c) rear body panels-upper/lower
   d) luggage lid
      1) hinge types
      2) torsion bars/support cylinders
      3) latch and strikers
   e) electrical
      1) wiring routes and connectors
      2) lamp assemblies and bulbs
         (i) tail/turn/stop
         (ii) side marker
         (iii) compartment lamp
      3) remote solenoid
   f) fuel tank
      1) methods of attachment
      2) removal and installation
      3) replacement of sending unit
      4) safety precautions

v) moldings and trim
   a) types
   b) methods of attachment and removal
      1) conventional clip
      2) adhesive installed
   c) special fasteners and tools
   d) locations for use

vi) general auto body sealers and adhesives
   a) seam and joint sealers
      1) types
      2) cure characteristics
C. Lesson Three: Auto Body Hand Tools

1. Learning Outcomes: Upon successful completion of this lesson, the student will:

   a. The student will perform basic metal straightening procedures. (C18, 19) (F9)
   b. Utilize basic body shop hand tools. (C18, 19)
   c. Use basic shop math to add, subtract, multiply and divide whole numbers, fractions, decimals and percentages. (C18, 19)
   d. Use both Metric and U.S. Customary measurements in auto collision repair applications. (F3)
   e. Identify and properly use related special tools. (C18, 19)

2. Learning Activities:

   a. The student will complete reading assignments as assigned. (F1, F11, C5, C6)
   b. The student will study the words/terms and complete written assignments specified by the instructor. (F1, F11, C5, C6)
   c. The student will attend classroom lectures and participate in classroom discussion. (F5 thru 7, F9, F10, C1, C5 thru 7)
   d. The student will observe demonstrations performed by the instructor. (F5, F10, C5, C6, C14)
   e. The student will complete laboratory learning activities assigned by the instructor. See the laboratory learning activity list attached. (F1 thru F17, C1, C3, C5 thru 9, C14 thru 16, C18 thru 20)
3. **Equipment and Materials:**
   a. Proper safety equipment
   b. All basic hand tools available to the program
   c. Scrap auto body panels for student practice
   d. TV/VCR (as required)
   e. Others as selected by the instructor.

4. **Audio Visual Aids:** (Recommended)
   a. To be selected by the instructor from those listed in Section III D above.
   b. Others as selected by the instructor.

5. **Lesson Outline:**
   a. Math Review
      (1) addition
      (2) subtraction
      (3) division
      (4) multiplication
      (5) whole numbers
      (6) fractions
      (7) decimals
      (8) percentage
   b. Measurements Review
      (1) U.S. Customary System
      (2) Metric
   c. Body Hammers
      (1) types
         (a) roughing
         (b) bumping
         (c) finishing
         (d) special use
      (2) proper selection and **CARE**
         (a) purpose of face crown and shape
         (b) weight and balance
         (c) task requirements/restrictions
      (3) proper use
         (a) grip
         (b) swing control
         (c) rebound control
         (d) coordination with a dolly
         (e) safety
d. Dolly Blocks
   (1) types
   (2) proper selection
      (a) purpose of shape
      (b) weight and balance
      (c) task requirements/restrictions
         i) panel crown
         ii) purpose for use
            a) striking tool
            b) back-up tool
   (3) proper use
      (a) panel preparation
      (b) hand protection
      (c) hidden dolly location

e. Hammer/Dolly Techniques
   (1) Hammer On-Dolly
      (a) purpose
         i) stretching
         ii) smoothing

      (b) procedure
         i) hammer/dolly selection
         ii) hammer/dolly coordination
            (a) gauging strength of hammer blows
            (b) determining dolly pressure
            (c) controlling hammer/dolly rebound
            (d) proper overlapping of blows

   (2) Hammer Off-Dolly
      (a) primary purposes
      (b) procedure
         i) hammer/dolly selection
         ii) hammer/dolly placement
         iii) hammer/dolly coordination
            a) hammer
               i) location of blows
               ii) blow sequence and strength
               iii) effective hammer to dolly distance
            b) dolly
               i) relocation of dolly during work
               ii) compensating for rebound loss
               iii) correct dolly pressure

f. Spoons and Picks
(1) spoons  
   (a) bumping spoons  
   (b) body spoons  
   (c) driving spoons  

(2) pry picks and punches  
(3) general use areas and procedures  
(4) stretch precautions  

**g. Pull Rods**  
(1) general purposes  
(2) types  
   (a) standard  
   (b) close tolerance  
(3) lifting points  
(4) general procedures  
   (a) drilled hold spacing  
   (b) pull sequence  
   (c) multiple pulls  
   (d) use with heat  
   (e) over-pull precautions  
(5) capabilities and limitations  

**h. Slide Hammer**  
(1) general purposes  
(2) types and sizes  
(3) attachments and use  
   (a) screw equipped  
      i) drilled vs. punched hole  
      ii) hole spacing  
      iii) over-pull precautions  
      iv) capabilities and limitations  
   (b) flange attachments  
   (c) driving attachments  
   (d) miscellaneous attachments  
      i) body clamps  
      ii) locking pliers  
      iii) pull plates  

**i. Miscellaneous Hand Tools**  
(1) identification  
   (a) hammers  
      i) ball pen  
      ii) cross pen (blacksmith’s)  
      iii) sledge  
   (b) cutting tools  
      i) hack saw  
      ii) snips
D. **Lesson Four:** Auto Body Power Tools

1. **Learning Outcomes:** Upon successful completion of this lesson, the student will:

   a. The student will perform basic metal straightening procedures. (C18, 19) (F9)
   b. Correctly and safely use pneumatic and electric power tools. (C18, 19)
   c. Identify and properly use related special tools. (C18, 19)

2. **Learning Activities:**

   a. The student will complete reading assignments as assigned. (F1, F11, C5, C6)
   b. The student will study the words/terms and complete written assignments specified by the instructor. (F1, F11, C5, C6)
   c. The student will attend classroom lectures and participate in classroom discussion. (F5 thru 7, F9, F10, C1, C5 thru 7)
   d. The student will observe demonstrations performed by the instructor. (F5, F10, C5, C6, C14)
   e. The student will complete laboratory learning activities assigned by the instructor. See the laboratory learning activity list attached. (F1 thru F17, C1, C3, C5 thru 9, C14 thru 16, C18 thru 20)
a. Proper safety equipment
b. All power tools available to the program
c. Scrap auto body panels for student practice
d. Special tools (as appropriate)
e. TV/VCR (as required)
f. Others as selected by the instructor.

4. Audio Visual Aids: (Recommended)
   a. To be selected by the instructor from those listed in Section III D above.
   b. Others as selected by the instructor.

5. Lesson Outline:
   a. Compressed Air System
      (1) air compressors
          (a) types and advantages
              i) single stage
              ii) two stage
          (b) determining size requirements
              i) number of air tools
              ii) cfm requirements
          (c) maintenance
      (2) delivery system
          (a) piping
              i) size and type
              ii) routing and take-offs
          (b) transformer/separators
              i) types and function
              ii) installation
              iii) maintenance
          (c) hoses
              i) construction
              ii) sizes and selection
      (d) couplers
      (e) maintenance
   b. Impact Wrenches and Air Rachets
      (1) construction and operation differences
      (2) types and sizes
      (3) safety
          (a) socket selection
          (b) use of adapters
          (c) general operation safety
c. Impact Hammers
   (1) construction and general operation
   (2) bit selection and use
   (3) attachments
      (a) flange tool
      (b) door skin remover

d. Cut-off Tool
   (1) use areas
   (2) disc selection
   (3) safety
   (4) maintenance

e. Nibblers and Power Shears
   (1) use area
   (2) cut control
      (a) free hand
      (b) use of a fence
   (3) safety
   (4) maintenance

f. Reciprocating Saw
   (1) use area
   (2) blade selection
   (3) cut control
   (4) safety

g. Drills
   (1) types and sizes
   (2) uses
   (3) drilling body steel
      (a) marking
      (b) bit selection
         i) split point
         ii) uni-bits
   (4) spot weld cutters and hole saws
   (5) abrasive holders and wire wheels
   (6) safety
   (7) maintenance

h. Power Sanders
   (1) types
      (a) speed Sanders (air files)
         i) straight line
         ii) orbital
      (b) random orbit disc sander
      (c) orbital sander
   (2) proper selection and use
i. Portable Disc Grinders/Sanders
   (1) types
   (2) backing plates-types and sizes
   (3) uses
      (a) paint and plastic filler
      (b) metal work
   (4) operation
      (a) techniques
         i) crosscutting
         ii) buffing action
         iii) abrasive selection
      (b) actions on crowns
         i) high crowns
         ii) low crowns
         iii) reverse crowns
         iv) panel protection
         v) disc cutting and trimming

j. Body Jacks-Hydraulic
   (1) common sizes
      (a) four ton
      (b) ten ton
   (2) components and functions
      (a) pumps
         i) manual
         ii) pneumatic
      (b) hoses
      (c) couplers
      (d) rams
         i) pushing
         ii) pulling
         iii) spreader
      (e) extensions and attachments
         i) joining methods
            a) threaded
            b) snap on
            c) lock on
         ii) types
            a) bases
            b) saddles
            c) flex head
            d) adjustable spoons
e) toes  
f) connectors  
g) clamps  
h) chains

iii) basic set-ups  
a) pushing  
b) pulling  
c) spreading  
d) clamping

iv) care and use precautions

k. Special Tools and Equipment

E. **Lesson Five:** Abrasives

1. **Learning Outcomes:** Upon successful completion of this lesson, the student will:

   a. Identify, describe and select the proper type of abrasive for specific repair operations. (C18, 19)
   b. Identify and properly use related special tools. (C18, 19)

2. **Learning Activities:**

   a. The student will complete reading assignments as assigned. (F1, F11, C5, C6)
   b. The student will study the words/terms and complete written assignments specified by the instructor. (F1, F11, C5, C6)
   c. The student will attend classroom lectures and participate in classroom discussion. (F5 thru 7, F9, F10, C1, C5 thru 7)
   d. The student will observe demonstrations performed by the instructor. (F5, F10, C5, C6, C14)
   e. The student will complete laboratory learning activities assigned by the instructor. See the laboratory learning activity list attached. (F1 thru F17, C1, C3, C5 thru 9, C14 thru 16, C18 thru 20)

3. **Equipment and Materials:**

   a. Selections of abrasives representative of the various:
      1) abrasive types  
      2) grit sizes  
      (3) grit spacing (types C or D)  
      (4) non-loading coatings  
      (5) backing  
         (a) materials

ABDR 1419 23
(b) weights
(c) shapes and sizes

b. back-up tools and holders
c. miscellaneous tools and holders
d. TV/VCR (as required)
e. Others as selected by the instructor.

4. Audio Visual Aids: (Recommended)

a. To be selected by the instructor from those listed in Section III D above.
b. Others as selected by the instructor.

5. Lesson Outline:

a. Common Abrasives
   (1) types
       (a) garnet
       (b) flint
       (c) emery
       (d) aluminum oxide
       (e) silicon carbide
   (2) sources of abrasives
   (3) sheet/disc manufacturing process
b. General Uses of Abrasives
   (1) rust removal
   (2) paint removal
   (3) featheredging
   (4) smoothing of rough surfaces
   (5) adhesion for repair materials

b. Abrasives Used in Body Repair
   (1) types
       (a) silicon carbide
       (b) aluminum oxide
   (2) characteristics
   (3) recognition
   (4) grit arrangement
       (a) open coat
       (b) closed coat
       (c) purposes
   (5) non-loading coatings
   (6) backing materials
       (a) types
           i) dry
ii) waterproof  
(b) backing weights  
(c) resins and glue  
(d) sizes and configurations  
(e) characteristics and uses  
(7) grit sizing  
(8) grit ranges  
(a) paint repair  
(b) metal and plastic repair  
(c) sandpaper discs  
(d) portables grinder discs  
(9) back-up tools  
(a) types  
  i) rubber blocks  
  ii) file boards  
  iii) squeegees  
  iv) sponge pads  
  v) “homemade” tools  
(b) sizing paper for tools  
(c) folding paper for use  
(10) general sanding  
(a) safety  
(b) grit use sequence  
  i) plastic fillers  
  ii) featheredging of paint  
    a) paint type  
    b) hand sanding  
    c) power sanding  
    d) creating a featheredge  
  iii) scuff sanding

F. Lesson Six: Body Fillers and Sealers

1. Learning Outcome: Upon successful completion of this lesson the student will:
   
a. Utilize appropriate plastic filler applications and techniques. (C18, 19)
   b. Identify, describe and properly apply body sealers. (C18, 19)
   c. Identify and properly use related special tools. (C18, 19)

2. Learning Activities:
   
a. The student will complete reading assignments as assigned. (F1, F11, C5, C6)
b. The student will study the words/terms and complete written assignments specified by the instructor. (F1, F11, C5, C6)

c. The student will attend classroom lectures and participate in classroom discussion. (F5 thru 7, F9, F10, C1, C5 thru 7)

d. The student will observe demonstrations performed by the instructor. (F5, F10, C5, C6, C14)

e. The student will complete laboratory learning activities assigned by the instructor. See the laboratory learning activity list attached. (F1 thru F17, C1, C3, C5 thru 9, C14 thru 16, C18 thru 20)

3. **Equipment and Materials:**

   a. personal safety equipment
   b. selections of available body fillers
   c. portable disc grinders, sanders, “cheesegrater” files, etc.
   d. abrasives and holders for filler repair
   e. assortment of spreaders and mixing boards
   f. scrap body panels for student practice representative of:
      (1) high/low crowns
      (2) reversed style lines
      (3) seamed panels
   g. miscellaneous equipment
      (1) masking paper and tape
      (2) protection tape
      (3) clean-up materials
   h. TV/VCR (as required)
   i. Others as selected by the instructor.

4. **Audio Visual Aids:** (Recommended)

   a. To be selected by the instructor from those listed in Section III D above.
   b. Others as selected by the instructor.

5. **Lesson Outline:**

   a. Types of Fillers
      (1) conventional (heavy weight)
      (2) lightweights
      (3) metal filled
      (4) sprayable
      (5) color change types
      (6) epoxy-based
   b. Filler Components-characteristics/purpose
      (1) resins
      (2) fillers
(3) catalysts-creme and liquid
(4) handling and safety
c. Metal Preparation
(1) correct shape and dimensions
(2) welded areas
   (a) cracks, holes, joint seams
   (b) cleaning
   (c) grinding flush vs. recessing
   (d) fusion vs. riveting
(3) paint removal
   (a) tools
   (b) abrasive choice
d. Metal Cleaning
e. Adjacent Panel Protection
f. General Filler Application
   (1) preparation
      (a) tool selection
         i) mixing board-composition
         ii) spreader type and size
         iii) abrasive holders-type and size
         iv) cleanliness of tools
   (2) filler/catalyst mix
      (a) filler/catalyst ratio
      (b) folding vs. stirring/whipping
      (c) proper mix indications
   (3) application
      (a) types of coats
         i) adhesion
         ii) fill
         iii) finish
      (b) direction of application
      (c) pressure
   (4) tool clean-up
   (5) cure indications
g. Shaping and Smoothing Procedures
   (1) shaping
      (a) “cheesegrater” blades
         i) positioning
         ii) stroke direction and angle
         iii) crosscutting
      (b) power sanders
         i) tool selections
         ii) abrasive sequence
         iii) positioning and movements
         iv) problems
(c) cut depth indications

(2) smoothing
(a) tool selection and use
(b) abrasive choice and sequence
(c) scut depth and contour indications
(d) pinholes and sandscratches
   i) prevention
   ii) detection
   iii) filler vs. glazing putties
(e) use of primer guide coats

h. Special Situations
(1) problem areas
(a) reverse curved/angled
(b) inside corners
(c) styles lines
(d) flexible body seams/joints
(e) panel edges
(f) moulding clip studs and holes

(2) application procedures
(3) finishing procedures

i. Misuse Problems and Cures
(1) improper mixing
   (a) filler
   (b) catalyst
   (c) filler and catalyst
      i) combination
      ii) ratio
   d) contaminated material and tools
(2) improper application
   (a) depth limits
   (b) adhesion coat
   (c) direction of application
(3) improper conditions
   (a) temperatures
   (b) moisture and high humidity
(4) improper pane preparation
   (a) contour and dimensions
   (b) cleanliness and “tooth”
   (c) temperature
   (d) rusted areas

j. Sealers
INSTRUCTIONS FOR ALL STUDENTS: Student texts, notes and service manuals may be used in performance of the tasks. **The instructor must verify satisfactory completion of each task by entering the date and his initials in the date column for each task.** The instructor will not verify satisfactory completion of the task until all standards have been met. The grade earned will be entered in the task# column. To meet minimum requirements, the student must correctly complete each task listed below one time. **Each performance exam will count 4.5 points.** A maximum of 100 points will be awarded. **NOTE:** Failure to follow instructions, record required data, use correct tools in correct manner, clean work area, secure tools and equipment, absence, or unsafe act will result in a deduction of points from your total lab score.

<table>
<thead>
<tr>
<th>TASK #</th>
<th>LEARNING ACTIVITY DESCRIPTION</th>
<th>DATE</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>See your instructor and explain the basics of OSHA.</td>
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<td>2.</td>
<td>See your instructor and explain the basics of the Hazardous Communications Act.</td>
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<td>3.</td>
<td>Locate and use an MSDS as directed by the instructor.</td>
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<td>4.</td>
<td>See your instructor and answer questions about safety and first aid.</td>
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<td>5.</td>
<td>Identify and describe the differences and similarities in conventional and unibody construction.</td>
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<tr>
<td>6.</td>
<td>Identify the common locations of HSS/HSLA steels in unibody constructed vehicles.</td>
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<td>7.</td>
<td>Trace the flow of force through a vehicle during a collision and describe the relationship of body construction to occupant safety.</td>
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<td>8.</td>
<td>Identify the major crown classifications and describe the strength characteristics of each.</td>
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<td>9.</td>
<td>Identify the major construction features of both a conventional perimeter frame and a unibody underbody.</td>
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<td>10.</td>
<td>Identify and describe general hand tools from a display provided by the instructor and demonstrate their proper use.</td>
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<td>11.</td>
<td>Select the proper tool for use on specific fasteners indicated by the instructor.</td>
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<tr>
<td>12.</td>
<td>Demonstrate the proper and safe use of power wrenches.</td>
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<tr>
<td>13.</td>
<td>Demonstrate the proper and safe use of power cutting tools.</td>
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<tr>
<td>14.</td>
<td>Demonstrate the basic and safe use of hydraulic jacking equipment.</td>
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<tr>
<td>15.</td>
<td>Identify body working hand tools from a display provided by your instructor.</td>
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</tbody>
</table>
| 16. | Demonstrate the following hammer techniques:  
   a. hammer-on  
   b. hammer-off  
   c. pick hammering |
| 17. | Demonstrate the proper use of the following tools:  
   a. spoons  
   b. pry picks and bars  
   c. pull rods |
| 18. | Write a three to four page paragraph-style report discussing the characteristic and proper selection of abrasives used in auto collision repair. Cover those topics in the review sheet on abrasives. |
| 19. | Demonstrate the proper and safe use of power sanders and grinders indicated by your instructor. |
| 20. | Properly prepare, apply, and finish to contour, body filler on a:  
   a. low crown panel  
   b. high crown panel  
   c. reverse style lines  
   d. panel joint |
| 21. | Correctly choose and properly apply joint/seam sealer. |
| 22. | Properly and safely use and maintain tools and equipment and practice shop safety. Graded throughout the course. |

**TOTAL POINTS/GRADE AWARDED (Possible 100 points)**
CENTRAL TEXAS COLLEGE
COMPETENCY PROFILE

Program: Auto Collision Repair

Course: ABDR 1419 Auto Body Shop Procedures (144 clock hours) (4 credits)

Entry Occupation: Auto Body Repair Helper/Apprentice

Instructor:

<table>
<thead>
<tr>
<th>Student Name:</th>
<th>SSAN:</th>
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<tbody>
<tr>
<td>Date Enrolled:</td>
<td>Date Completed/Withdraw:</td>
</tr>
<tr>
<td>Total Hours Absent:</td>
<td>Final Grade</td>
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</tbody>
</table>

RATING SYSTEM

The instructor will evaluate the student by placing a check mark in the appropriate number block to indicate the student's degree of competency. (Enter N/A if the item is not applicable or not observed.) The rating for each task reflects the instructor's evaluation of employability readiness rather than the grade given in the class. The final grade is not an average of ratings. The rating scale listed below will be used to rate the student.

RATING SCALE

1 = 95(A) = Mastered competency: Highly proficient. Can perform task without supervision. Can teach others. Meets or exceeds SCANS requirements.

2 = 85(B) = Mastered Competency: Proficient. Can perform task with limited supervision. Meets most SCANS requirements.

3 = 75(C) = Mastered Competency: Can perform task but requires close supervision. Meets minimum SCANS requirements.

4 = 0(F) = Did NOT master competency: Unable to or did not attempt to perform task. Does not meet SCANS requirements.
<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>1</th>
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<tbody>
<tr>
<td><strong>Learning Outcome 1:</strong> The student will perform basic metal straightening procedures. (C18,19) (F9)</td>
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<tr>
<td><strong>Learning Outcome 2:</strong> Utilize basic body shop hand tools. (C18,19)</td>
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<tr>
<td><strong>Learning Outcome 3:</strong> Utilize appropriate plastic filler application and techniques. (C18,19)</td>
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<tr>
<td><strong>Learning Outcome 4:</strong> Comply with personal and environmental safety practices associated with clothing, eye protection, and use of chemicals, hand tools and power equipment. (C18,19)(F1)</td>
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<tr>
<td><strong>Learning Outcome 5:</strong> Describe the role and basic provisions of OSHA, The Hazardous Communications Act, and the use of MSDS. (F1)</td>
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<td><strong>Learning Outcome 6:</strong> Use basic shop math to add, subtract, multiply and divide whole numbers, fractions, decimals and percentages  (C18,19)</td>
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<td><strong>Learning Outcome 7:</strong> Use both Metric and U.S. Customary measurements in auto body repair applications.(F3)</td>
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<tr>
<td><strong>Learning Outcome 8:</strong> Correctly and safely use pneumatic and electric power tools. (C18,19)</td>
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<tr>
<td><strong>Learning Outcome 9:</strong> Identify and properly use related special tools. (C18,19)</td>
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<tr>
<td><strong>Learning Outcome 10:</strong> Identify, describe and select the proper type of abrasive for specific repair operations. (C18,19)</td>
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<tr>
<td><strong>Learning Outcome 11:</strong> Identify, describe and properly apply body sealers. (C18,19)</td>
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<tr>
<td><strong>Learning Outcome 12:</strong> Describe the composition and properties of the basic materials used in auto body construction and their relationship to production and general repair procedures. (C18,19)</td>
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<tr>
<td><strong>Learning Outcome 13:</strong> Recognize body/frame types in terms of function, design configuration and manner of construction. (C15)</td>
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<tr>
<td><strong>Learning Outcome 14:</strong> Identify and describe the major body components, assemblies, fasteners and assembly methods. (C15)</td>
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<tr>
<td>Learning Outcome 15: Identify and explain the use of various types of fire extinguishers. (C18)</td>
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<td>Learning Outcome 16: Name the classes of fires and explain them. (C18)</td>
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<td>Learning Outcome 17: Discuss first aid. (C6) (F7)</td>
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</table>
Workplace Know-How and Personal Characteristics

The rating system listed below will be used by the Worksite Supervisor to evaluate the student’s workplace know-how and personal characteristics. The Worksite Supervisor will evaluate the student on the following competency (task) listed by circling the appropriate rating from the rating scale below that best describes his/her observation of the student during the entire length of this course for the rated area (task). Enter the date the task was completed in the date column.

Rating Scale

1 = Above Average
2 = Average
3 = Below Average
N/A = Not Observed

<table>
<thead>
<tr>
<th>COMPETENCIES: Effective workers can productively use:</th>
<th>Rating</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resources: allocating time, money, materials, space, staff.</td>
<td>1 2 3 N/A</td>
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</tr>
<tr>
<td>Interpersonal Skills: working on teams, teaching others, serving customers, leading, negotiating and working Well with people from culturally diverse backgrounds.</td>
<td>1 2 3 N/A</td>
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<tr>
<td>Information: acquiring and evaluating data, organizing and maintaining files, interpreting and communicating and using computers to process information.</td>
<td>1 2 3 N/A</td>
<td></td>
</tr>
<tr>
<td>Systems: understanding social, organizational, and technological systems, monitoring and correcting performance and designing or improving systems.</td>
<td>1 2 3 N/A</td>
<td></td>
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<tr>
<td>Technology: selecting equipment and tools, applying technology to specific tasks and maintaining and troubleshooting technologies.</td>
<td>1 2 3 N/A</td>
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</table>

THE FOUNDATION: Competence requires:

| Basic Skills: reading, writing, arithmetic and mathematics, speaking and listening. | 1 2 3 N/A |
| Thinking Skills: thinking creatively, making decisions, solving problems, seeing things in the mind's eye, knowing how to learn and reasoning. | 1 2 3 N/A |
| Personal Qualities: individual responsibility, self-esteem, sociability, self-management and integrity. | 1 2 3 N/A |

PERSONAL CHARACTERISTICS

| Relations with others: Effectiveness in working with students, instructors and others; cooperation; shows respect. | 1 2 3 N/A |

ABDR 1419
**Dependability**: attendance; loyalty; punctuality; adherence to schedules and deadlines; consistency and results; perseverance.

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**Work Attitudes**: willingness to learn; willingness to accept and profit from evaluation; enthusiasm; initiative; commitment; pride in work.

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<th>N/A</th>
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</table>

**Communication**: listening; speaking; and nonverbal skills; effectiveness in communicating with students, teachers and others.

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**Personal Hygiene-Grooming**: personal health care and cleanliness, dresses and maintains self appropriately for a business environment.

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<th>N/A</th>
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Based on my observation/evaluation of the student he/she has: (place a “✓” in the appropriate block).

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<tbody>
<tr>
<td>Entry level skills now.</td>
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<td>Entry level skills but requires additional external learning experience.</td>
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<tr>
<td>Entry level skills but requires additional course work.</td>
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<tr>
<td>Entry level skills but requires additional course work and additional external learning experience.</td>
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</table>

**Instructor Comments**: (Please provide additional information regarding your evaluation of the student’s performance.)

____________________________________________________________________________

____________________________________________________________________________


**INSTRUCTOR CERTIFICATION**

I certify this competency profile to be true and accurate to the best of my knowledge.

Signature: ___________________________ Date: ________________

I have seen this evaluation and discussed it with my Instructor.

Student Signature: ___________________________ Date: ________________

<table>
<thead>
<tr>
<th>Written Exam</th>
<th>First</th>
<th>Second</th>
<th>Exit</th>
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<tbody>
<tr>
<td>Final Score</td>
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