I. INTRODUCTION

A. An introduction to oxy-fuel welding and cutting, safety, set-up and maintenance of oxy-fuel welding and cutting equipment and supplies.

B. Introduction to Oxy-fuel Welding and Cutting (WLDG 1425) is a required course for the completion of a Level I or II Certificate of Completion in the Welding Technology Program.

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

D. Prerequisites: This course has a prerequisite or co-requisite of WLDG 1323 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, Introduction to Oxy-fuel Welding and Cutting, the student will:

A. Describe or explain oxy-fuel welding and cutting safety procedures. (C7)
B. Identify and classify fuels and filler metals. (C7)
C. Perform entry-level oxy-fuel welding and cutting operations. (C18, 19)
D. Select proper equipment and materials. (F8)
E. Describe how to maintain the major components of oxy-fuel welding equipment. (C20)
F. Explain the method of testing and oxy-fuel system for leaks. (F6)
G. Demonstrate how to set-up, light, adjust, extinguish, and disassemble oxy-fuel welding equipment safely. (C19)
H. List the major advantages and disadvantages of the different fuel gases. (F2)
I. Explain what conditions affect the selection of filler metal. (C7) (F6)
J. Define welding, soldering, and brazing terms. (C7) (F6)
K. Explain how the flame-cutting process works. (C7) (F6)
L. Describe plasma arc cutting and describe a plasma torch. (C7)
M. Explain how plasma cutting torch works. (C7) (F6)
N. List the advantages and disadvantages of using a plasma cutting torch. (F2)
O. Demonstrate ability to set-up and use a plasma cutting torch. (C18, 19)
P. Explain the effects of torch angle, flame height, filler metal size, and welding speed on gas welds. (C7) (F6)
Q. Explain the advantages and disadvantages of liquid solid phase bonding. (C7) (F6)
R. Describe the functions of fluxes in making proper liquid-solid phase bonded joints. (C7) (F6)
S. Properly set-up and shut-down brazing equipment and perform required brazing operations. (C19)
T. Properly and safely use and maintain tools and equipment. (C20)
U. Practice shop safety. (F12)
V. Complete a task that involves planning a project, doing a budget, selecting personnel, doing an organizational chart, determining material requirements and determining cost. (F2, 3, 4, 7, 8, 10) (C1, 2, 3, 4, 18, 19)
W. Perform a task that requires working with others and negotiations. (C9, 13)

III. INSTRUCTIONAL MATERIALS

A. Instructional materials for this course may be found at www.ctcd.edu/books
B. Supplemental Reading: As assigned by the instructor.
C. Audio-visual aids: See resource list at end of this module book.
D. Other instructional material: as selected by the instructor.

IV. COURSE REQUIREMENTS

A. This course is being taught in a self-paced mode. It differs from the traditional college course in that you are allowed to work on your own and at your own speed within limitation. This course is 96 clock hours in length. The student may set his/her own schedule within the time frame the course is offered. You must attend class on the days and at the times you selected when you enrolled in the course.
You will have an assigned instructor. If at any time you do not understand a reading assignment, audio visual presentation or lab work, ask your instructor for assistance. He is there for you!

This module book is designed to inform you of the sequence in which this course will be presented. You must follow this sequence and you must do what the module book says. It contains reading assignments, written assignments, audio visual presentations and lab assignments that you must complete or watch. Written assignments will be turned in as directed by the instructor. Late assignments will not be accepted. You must let your instructor know when you are ready to do a learning activity, performance exam or take a scheduled exam.

B. The student must take notes when viewing filmstrips, slides, or videos. Exams may be taken from audio visual aids, reading and lab assignments. If instructor notes or handouts are given to you, you must study them; exams may be taken from these notes also.

C. The instructor may give written assignments or “pop” quizzes as he deems necessary.

D. Performance Exams: Each student will clean all tools and equipment that he/she uses and properly store them and clean the work area after the completion of each task.

Certificate Students: All lab work will be completed on an individual basis. The student will receive a "pass", "fail", or “alpha-numeric” grade on the task. Students who fail to complete a task correctly to industry standards must repeat the task. The instructor will date and initial each performance exam task as it is satisfactorily completed. NOTE: Students who have selected the Alpha-Numeric grading system will be graded as outlined for degree students (see below).

E. The following is part of the course requirements: Each student will assist in lab clean-up as directed by the instructor and will assist in unloading and storing supply shipments. Failure to do so will result in a failure to complete all course requirements, and the student could receive an "N" for the course.

F. There will be five (5) written examinations in this course (4 module/unit exams and an exit exam). Written exams must be completed before taking the performance exam for each module. The exit exam is a comprehensive exam that covers the entire course. Certificate students must score 70% on the exit exam. Certificate students will be allowed to take the exit exam a maximum of three (3) times. Failure to achieve a 70% score on the exit exam in three (3) tries will result in an "N" for the course, and the student must retake the course. Degree Students should refer to the "grading" section of this outline for guidance.
G. The student must complete the written assignments to receive a grade. **Written assignments for each unit will be turned in to the instructor prior to starting performance exams for that module.** Degree students must complete reading and written assignments at home.

H. If you have special needs because of learning disabilities or other kinds of disabilities, please feel free to discuss this with the instructor. The instructor will attempt to meet your needs with the assistance of counselors, tutors (Project Mainstream), and the assistance of the Disabilities Services Office. Program/course integrity will not be sacrificed. Students must meet all course requirements.

V. GRADING

Certificate Students: Students will be graded using the standard Skills Center "Pass or Fail" system used for self-paced programs. To satisfactorily complete the written exams, the student must score 80% on tests (except the exit exam, 70%). Students who fail to make the 80% on any exam (except the exit exam) must retake the exam. The current test re-take policy will apply to all certificate students. The student must satisfactorily complete all written and performance exams to receive a passing grade ("P").

VI. NOTES AND ADDITIONAL INSTRUCTIONS FROM THE COURSE 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 semesters. The deadline for sessions of other 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 used for sessions 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,” “N,” “FN,” or “XN” 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 coursework 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” or “N” 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](http://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 requirements. 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. **NOTE**: This does not apply to VA, VA/Voc, or Financial Aid students. There are no excused absences for these students. Talk to your funding agency if you have questions.
I. Tools/Equipment:
   Required: welding helmet, personal protective equipment, safety glasses, welding gloves, jacket, pliers
   Suggested: 4 ½ grinder with wire bead brush
VII. FIRST CLASS MEETING

A. The instructor will introduce the course and show the student the textbook.

B. The instructor will verify the class roster/enrollment form:
   1. Call roll
   2. Have each student verify the spelling of his/her name and the social security number by initialing the class roster/enrollment form.
      NOTE: When a student’s name does not appear on the degree program class roster, they must bring it to the attention of the instructor and must present the instructor with CTC Form 29 (Add/Drop Slip) reflecting that he/she has properly registered for the course.

C. The instructor will have the student read and sign the course requirements sheet.

D. The instructor will discuss the following topics with the student:
   1. Course requirements, objectives, and how the course works
   2. Policy letters
   3. Student handouts
   4. Lab Sheet and lab work (Enabling Tasks, Performance Exams)
   5. Exam, grading, reading, and written assignments
   6. Absences
   7. Shop/Classroom cleanup -- tools
   8. Dress Code
   9. Parking
   10. Sign-In/Computer Use
   11. Course Outline/Fact Sheets/Student Handouts
   12. Hazardous Communications/MSDS Information
   13. Shop Safety
VIII. COURSE OUTLINE OR SEQUENCE

I. Module 1425-01: Oxy-Fuel Equipment, Gases and Fillers

A. Time:
   Certificate Student: 22 Hours
   Degree Student: 3 (2*) weeks

B. Module Objectives: Upon completion of this module the student should be able to:
   1. The student will describe or explain oxy-fuel welding and cutting safety procedures. (C7)
   2. Identify and classify fuels and filler metals. (C7)
   3. Select proper equipment and materials. (F8)
   4. Describe how to maintain the major components of oxy-fuel welding equipment. (C20)
   5. Explain the method of testing and oxy-fuel system for leaks. (F6).
   6. Demonstrate how to set-up, light, adjust, extinguish, and disassemble oxy-fuel welding equipment safely. (C19).
   7. List the major advantages and disadvantages of the different fuel gases. (F2).
   8. Explain what conditions affect the selection of filler metal. (C7) (F6).
   9. Define welding, soldering, and brazing terms. (C7) (F6).
   10. Explain how the flame-cutting process works. (C7) (F6).
   11. Properly and safely use and maintain tools and equipment. (C20).
   12. Practice shop safety. (F12)

C. Read Chapter 2 in Resource 1323-01. (Students who have not taken the welding safety exam only.)

D. Read Chapters 30 and 31 in Resource 1323-01 and answer the review questions at the end of each chapter. Turn the assignment into the instructor when completed.

E. Read Fact sheet 1425-01-01.

F. See your instructor and ask him to explain any part of the reading assignment that you do not understand.

G. View Audio Visuals (See your Instructor) Student must take notes.
   3. “Acetylene Cylinder Safety”, CEV #817 (Video) Resource 1425-04

H. **Complete Worksheet 1425-01-01.** Check your work with the answer sheet. See your instructor if you have any questions.

I. See your instructor and ask him to show you the various items of equipment, gases and fillers used in oxy-fuel welding and cutting. Ask him to demonstrate the proper set up of oxy-fuel welding equipment.

J. Refer to the Laboratory Learning Activities (Lab sheet) in this module book and complete the Learning Activities for this module.

K. See your instructor and ask him if there is any additional information that you should read or see that pertains to this module.

L. Review for Module 1425-01 Written Exam: Study all previous assignments in this module. See your instructor and ask him to explain any area that you do not understand.

M. Module 1425-01 Written Exam: (See your instructor).

N. Critique Module 1425-01 Written Exam: (See your instructor).

O. Module 1425-01 Performance Exam: Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the Performance exam for this module. (See your instructor)

P. Certificate students should complete this module by the end of the 22nd clock hour. Degree students should complete this module by the end of the 3rd (2nd*) week.
II. Module 1425-02: Oxy-fuel and Plasma Arc Cutting.

A. Time:
   Certificate Student: 20 Hours
   Degree Student: 3 (2*) weeks

B. Module Learning Outcomes: Upon completion of this module the student will:
   1. Explain how the flame-cutting process works. (C7) (F9)
   2. Describe plasma arc cutting and describe a plasma torch. (C7)
   3. Explain how plasma cutting torch works. (C7) (F6)
   4. List the advantages and disadvantages of using a plasma cutting torch. (F2)
   5. Demonstrate an ability to set-up and use a plasma cutting torch. (C18, 19)
   6. Properly and safely use and maintain tools and equipment. (C20)
   7. Practice shop safety. (F12)

C. Read Chapters 7 and 8 in Resource 1323-01 and answer the review questions at the end of each chapter. Turn the assignment into the instructor when completed.

D. Read Fact sheets 1425-02-01 and 1425-02-02.

E. See your instructor and ask him to explain any part of the reading assignment that you do not understand.

F. View Audio Visuals (See your Instructor) Student must take notes.
   1. "Oxy-acetylene Cutting", CEV #817 (Video) Resource 1425-05
   2. "Oxy-acetylene Cutting Explained", Bergwall #903 (4 Videos) Resource 1425-06

G. See your instructor and ask him to demonstrate proper oxy-fuel cutting procedures using regular equipment and the cutting machine.

H. See your instructor and ask him to demonstrate the proper set-up and use of the plasma arc cutting machine.

I. Refer to the Laboratory Learning Activities (Lab sheet) in this module book and complete the Learning Activities for this module.

J. See your instructor and ask him if there is any other information that you should view or read that pertains to this module.
K. Review for Module 1425-02 Written Exam: Study all previous assignments in this module. See your instructor and ask him to explain any area that you do not understand.

L. Module 1425-02 Written Exam: (See your instructor).

M. Critique Module 1425-02 Written Exam: (See you instructor).

N. Module 1425-02 Performance Exam: Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the Performance exam for this module. (See your instructor).

O. Certificate students should complete this module by the end of the 42nd clock hour. Degree students should complete this module by the end of the 6th (4th*) week.
III. Module 1425-03: Oxy-Fuel Welding

A. Time:
Certificate Student: 32 Hours
Degree Student: 6 (4*) weeks

B. Module Learning Outcomes: Upon completion of this module the student will:

1. The student will describe or explain oxy-fuel welding and cutting safety procedures. (C7)
2. Perform entry-level oxy-fuel welding and cutting operation. (C18, 19)
3. Select proper equipment and materials. (F8)
4. Describe how to maintain the major components of oxy-fuel welding equipment. (C20)
5. Explain the method of testing and oxy-fuel system for leaks. (F6)
6. Demonstrate how to set-up, light, adjust, extinguish, and disassemble oxy-fuel welding equipment safely. (C19)
7. List the major advantages and disadvantages of the different fuel gases. (F2)
8. Explain what conditions affect the selection of filler metal. (C7) (F6)
9. Explain the effects of torch angle, flame height, filler metal size, and welding speed on gas welds. (C7) (F6)
10. Properly and safely use and maintain tools and equipment. (C20)
11. Practice shop safety. (F12)

C. Read Chapter 32 in Resource 1323-01 and answer the review questions at the end of the chapter. Turn the assignment into the instructor when completed.

D. Read Fact sheets 1425-03-01 and 1425-03-02.

E. See your instructor and ask him to explain any part of the reading assignment that you do not understand.

F. View Audio Visuals (See your Instructor) Student must take notes.

1. "Oxy-Acetylene Welding Safety and Introduction", CEV #814 (Video)
Resource 1425-07.

G. See your instructor and ask him to demonstrate oxy-fuel weld equipment set-up and proper welding procedures for a butt, lap and T-joint in the flat, horizontal, vertical and overhead position.

H. Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the Learning activities for this module.
I. See your instructor and ask him if there is any additional information that you should read or see that pertains to this module.

J. Review for Module 1425-03 Written Exam: Study all previous assignments in this module. See your instructor and ask him to explain any area that you do not understand.

K. Module 1425-03 Written Exam: (See your instructor).

L. Critique Module 1425-03 Written Exam: (See your instructor).

M. Module 1425-03 Performance Exam: Refer to the Laboratory Learning Activities (Lab Sheet) in this module book and complete the Performance exam for this module. (See your instructor)

N. Certificate students should complete this module by the end of the 67th clock hour. Degree students should complete this module by the end of the 12th (8th*) week.
IV. Module 1425-04: Soldering and Brazing

A. Time:

Certificate Student: 16 Hours
Degree Student: 3 (2*) weeks

B. Module Learning Outcomes: Upon completion of this module the student will:

1. Define the terms soldering, brazing and braze welding.  ((C7) (F6)
2. Explain the advantages and disadvantages of liquid solid phase bonding.  (C7) (F6)
3. Describe the functions of fluxes in making proper liquid-solid phase bonded joints.  (C7) (F6)
4. Properly set-up and shut-down brazing equipment and perform required brazing operations.  (C18, 19)
5. Properly and safely use and maintain tools and equipment.  (C20)
6. Practice shop safety.  (F12)
7. Complete a task that involves planning a project, doing a budget, selecting personnel, doing an organizational chart, determining material requirements and determining cost.  (F2, 3, 4, 7, 8, 10) (C1, 2, 3, 4, 18, 19)
8. Perform a task that requires working with others and negotiations.  (C9, 13)

C. Read Chapter 33 in Resource 1323-01 and answer the review questions at the end of the chapter. Turn the assignment into the instructor when completed.

D. See your instructor and ask him to explain any part of the reading assignment that you do not understand.

E. View Audio Visuals (See your Instructor) Student must take notes.

1. "Oxy-Acetylene Welding and Brazing", CEV #815 (Video) Resource 1425-09.

F. See your instructor and ask him to demonstrate soldering and brazing procedures.

G. Refer to the Laboratory Learning Activities (Lab sheet) in this module book and complete the Learning Activities for this module.

H. See your instructor and ask him if there is any additional information you should see or read that pertains to this module.
I. Review for Module 1425-04 Written Exam: Study all previous assignments in this module. See your instructor and ask him to explain any area that you do not understand.

J. Module 1425-04 Written Exam: (See your instructor).

K. Critique Module 1425-04 Written Exam: (See your instructor).

L. Module 1425-04 Performance Exam: Refer to the Laboratory Learning Activities (Lab sheet) in this module book and complete the Performance exam for this module. (See your instructor)

M. Certificate students should complete this module by the end of the 90th clock hour. Degree students should complete this module by the end of the 15th (10th*) week.
V. Module 1425-05: Exit Exam

A. Time:
   Certificate Students 6 Clock Hours
   Degree Students 1 Week

B. Module Learning Outcomes: Upon completion of this module the student will:

   1. Use basic thinking skills and demonstrate personal qualities and work practices used in the work place.
   2. Complete the Exit Exam.

C. Review for Module 1425-05 Written (Exit) Exam: Review all previous assignments.

D. See your instructor and ask him to explain anything that you do not understand about oxy-fuel welding and cutting.

E. Module 1425-05 Written (Exit) Exam: (See your instructor). Certificate students must complete this exam by the end of the 96th clock hour. Degree students must complete this exam by the end of the 16th week.

F. Critique Module 1425-05 Written (Exit) Exam: (See your instructor).

G. There is no performance exam for this module.

H. End of Course Critique and enrollment in the next course in the program. (See your instructor).