I. INTRODUCTION
A. An introduction to Layout and Fabrication course which covers layout tools and processes. Emphasis on understanding and application of fabrication tools and layout programs available.
B. Introduction to Layout and Fabrication (WLDG 1317) is a required course for the completion of a two year Associate of Applied Science degree in Welding or 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 of all TACKER or FITTER courses except WLDG 2435 and WLDG 2488 (WLDG 1313, 1323, 1425, 1428, 1430, 1434, 1435, & 1457) or Department Chair approval, along with either Introduction to Computers (COSC-1300) or a strong working knowledge of computer programming.
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 Layout and Fabrication, the student will:

A. Apply appropriate techniques of fabrication.(C18,19)
B. Understand proper use of fabrication tools and equipment.
C. Understand appropriate use of design tools such as the PLASMACAM cutting system; including imported and original designs. (C18, C19)
D. Understand how thickness of metals and diameter of pipe affects usability in various fabrication applications. (C18, C19)
E. Design welding projects.(F10, F7)
F. Prepare drawings and produce templates.(F2) (C18,19) (F7)
G. Apply layout offsets; take offs.(C18,19)
H. Apply mathematical concepts in the design and construction of projects.(F3,4)
I. Prepare bill of materials.(F2,3,4)
J. Produce simple project using two or more fabrication tools covered in this course. (Must include the Plasmacam and Sheet Metal Break.) (C18, 19, F7, 10, 12)
III. INSTRUCTIONAL MATERIALS

1. Instructional materials for this course may be found at www.ctcd.edu/books
2. Supplemental Reading: as assigned by the Instructor
3. Audio Visual aids: See resource list at end of this module book.
4. 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 they use and properly store them and clean their 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”, or “fail” 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.

Degree Students: Laboratory tasks (performance exam) will be completed on an individual basis except when limited by tools and/or materials. Each performance exam is worth a maximum of 9.1 points. The maximum lab grade is 100 points. The instructor will deduct points from each lab task score for failure to follow safety precautions and/or a failure to complete the project to industry standards.
instructor will date, initial, and post the points earned for each performance exam as it is completed.

E. The following is part of the course requirements: Each student will assist in lab clean-up at the close of the evening classes 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 “F” or “N” for the course.

F. There will be four (4) written examinations in this course (3 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” or “F” for the course and the student must retake the course.

G. The student must complete the written assignments to receive a grade. **Written assignments for each unit will be turned into 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.

### GRADING

Students will be graded using the standard Skills Center “Pass or Fail” grade 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 satisfactory complete all written and performance exams to receive a passing grade (“P”).

A. Written exams: Average of written exams will count 40% of the final grade.

B. Completion of written assignments/activities will count 10% of the students’ final grade.

C. Performance Exams (Lab work) will count 50% of the final grade.

D. Grade Computation (Example):

Written Exam Scores: (There will be 4 written exams)
Exam 1 90
Exam 2  80  
Exam 3  70  
\[
\frac{240}{3} = 80 \text{ (Average Written Exams)}
\]

Written Exam Score Average  80 x 40% = 32 points  
Written Assignments  100 x 10% = 10 points  
Performance Exam Score  80 x 50% = 40 points  

Total =  82 points = P

V. 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 “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:** Absences 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 in 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
VI. 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 (Learning activities, Performance exams, competency profile)
   5. Exam, grading, reading and written Assignment
   6. Absences
   7. Shop/classroom cleanup-tools
   8. Dress code
   9. Parking
   10. Sign-in computer
   11. Course outline/fact sheets/student handouts
   12. Hazardous communications/MSDS information
   13. Shop safety
   14. Tools needed to perform task.
V. OUTLINE OR SEQUENCE

1. Module 1417-01 Safety and Equipment
   A. Time:
      Certificate Student: 12 hours
      Degree Student: (2*) weeks
   B. Learning Outcomes: Upon completion of this module the student will:
      1. Select proper equipment and materials (C18)
      2. Properly and safely use and maintain tools and equipment. (C20)
      3. Practice shop safety. (C5)
      4. Identify and explain basic metal working processes. (C7)
      5. Be familiar with and able to demonstrate the safe use of the fabrication tools. (C7)
      6. Review Mathematics (F4)
   C. Learning Activities:
      1. The student will complete reading assignments
      2. The student will study the words/terms and complete written assignments specified by the instructor
      3. The student will watch assigned videos and/or attend lectures or discussions and take notes
      4. The student will observe demonstrations performed by the instructor
      5. The student will complete laboratory learning activities assigned by the instructor. See the laboratory learning activity list attached.
   D. Equipment and Materials:
      1. Break
      2. Sheer cutter
      3. Pipe bender
      4. Hossfeld bender
      5. Scotchman Iron Working machine
      6. Factsheets 1417-01 thru 1417-10 and 1417-19
      7. Worksheet 1417-01
      8. Others as required by the instructor
   E. Audio Visual Aids:
      1. Resource 2403-07 Welding Shop Safety, DVD
      2. Resource 1413-07 Scotchman Industries Safety Video, #4014CM
      4. Resource 1417-01 Hydraulic Pipe Bending, #852
   F. Lesson Outline:

WLDG1317
1. Introduce the course
2. Review Resource 1323-01 Chapter 2, welding safety
3. Fabrication tools and Equipment
4. Review for Module 1417-01 written exam: Study all previous assignments in this module and ask your instructor to explain any area you do not understand.
5. Module 1417-01 Written Exam:
6. Critique Module 1417-01 Written Exam:
2. Module 1417-02 Introduction to CNC Data

A. Time:
   Certificate Student: 36 hours
   Degree Student: (4*) weeks

B. Learning Outcomes: Upon completion of this module the student will:
   1. Demonstrate understanding of PlasmaCam software (C19, C7, C8)
   2. Demonstrate understanding of the coordinates system (C7)
   3. Demonstrate an understanding of SNAP commands and their uses. (C7)
   4. Identify and explain different types of CNC data and which programs use which type of file. (C7, C18)
   5. Calculate dimensions and materials (F3, 4)
   6. Perform math calculations (F3)

C. Learning Activities:
   1. The student will complete reading assignments
   2. The student will study the words/terms and complete written assignments specified by the instructor
   3. The student will watch assigned videos and/or attend lectures or discussions and take notes
   4. The student will observe demonstrations performed by the instructor
   5. The student will complete laboratory learning activities assigned by the instructor. See the laboratory learning activity list attached.

D. Equipment and Materials:
   1. PlasmaCam Cutting Table
   2. Desktop Computer
   3. CD or Flash drive storage device
   4. Appendix II, III, IV, and V in Resource 1423-01
   5. Factsheets 1417-11 thru 1417-17
   5. Others as required by the instructor

E. Audio Visual Aids:
   1. Resource 912 Mathematics for Metal Fabricators & Welders

F. Lesson Outline:
   1. Review for Module 1417-02 Written Exam: Study all previous assignments in this module and ask your instructor to explain any area you do not understand.
   2. Module 1417-02 Written Exam: (see your instructor).
   3. Critique Module 1417-02 Written Exam: (see your instructor).
   4. Performance Exam
3. Module 1417-03 Importing and Designing Parts and Layout Fabrication

A. **Time:**
   - Certificate Student: 36 hours
   - Degree Student: (4*) weeks

B. **Learning Outcomes:** Upon completion of this module the student will:
   1. Demonstrate drawing using PlasmaCam software. (C7)
   2. Demonstrate understanding of “nesting” parts. (C7)
   3. Import drawing and modify for conversion to cutpaths. (C18, 19)
   4. Import picture and modify for conversion to cutpaths.
   5. Demonstrate using blueprints for part design. (C7)
   6. Demonstrate using scale to enlarge or reduce parts. (C7)
   7. Design, cut, and fabricate a table using 1 sheet of 4 x 4 ft. material. Include a decorative design on tabletop (C15, 18, 19 F7, 10, 12)

C. **Learning Activities:**
   1. The student will complete reading assignments
   2. The student will study the words/terms and complete written assignments specified by the instructor
   3. The student will watch assigned videos and/or attend lectures or discussions and take notes
   4. The student will observe demonstrations performed by the instructor
   5. The student will complete laboratory learning activities assigned by the instructor. See the laboratory learning activity list attached.

D. **Equipment and Materials:**
   1. PlasmaCam Cutting Table
   2. Desktop Computer
   3. CD or Flash drive storage device
   4. Chapters 7, 8, 9, and 18 in Resource 1423-01
   5. Factsheets 1417-01 thru 1417-11 and 1417-18
   6. Worksheets 1417-02 through 1417-07
   7. Others as required by the instructor

E. **Audio Visual Aids:**
   1. None

F. **Lesson Outline:**
2. Review for Module 1417-03 Written Exam: Study all previous assignments in this module and ask your instructor to explain any area you do not understand.
3. Module 1417-03 Written Exam: (see your instructor).
4. Critique Module 1417-03 Written Exam: (see your instructor).
5. Performance Exam
5. Module 1417-04 Exit Exam

A. Time:
   Certificate Student: 12 hours
   Degree Student: (2*) weeks

B. Learning Outcomes:
   Use basic thinking skills and demonstrate personal qualities and work practices in the work place. (C9, 15, 18, 19, F5, 6)

C. Learning Activities:
   1. Complete the Exit Exam

D. Equipment and Materials:
   1. None

E. Audio Visual Aids:
   1. None

F. Lesson Outline:
   1. Review for Module 1417-04 Written (Exit) Exam: Review all previous assignments.
   2. See your instructor and ask him to explain anything that you do not understand about fabrication tools, math for welders, or using CNC data in fabrication.
   3. Module 1417-04 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.
   4. Critique Written (Exit) Exam: (See your instructor).
   5. There is no performance exam for this module.
   6. End of course Critique and enrollment in the next course in the program. (See your instructor.)