

**GREAT PLAINS TECHNOLOGY CENTER
COURSE OF STUDY**

<u>Career Cluster:</u>	Manufacturing (MN)
<u>Career Pathway:</u>	Welding and Metal Fabrication (MN007)
<u>Career Major:</u>	Combination Welder (MN0070030)
<u>Career Major Hours:</u>	Secondary Students: 1050 Hours Adult Students: 1050 Hours
<u>Instructor:</u>	Name: Allen Bellamy Office Number: (580) 250-5626 E-Mail Address: abellamy@greatplains.edu
<u>Academic Credit:</u>	Secondary Students: 3 high school credits per year Adult Students: Transcript
<u>Prerequisites:</u>	None.

Career Major Description:

This major will teach students to do quality welding for a variety of construction and manufacturing jobs using multiple structural welding techniques. Instruction will cover welding theory and safety, fabrication, layout, print reading, symbols, math, welding codes, metal characteristics/properties and oxyfuel cutting. Students will learn to perform high quality welds in accordance with welding procedure specifications used in a variety of welding occupations. They will also gain an introduction to pipe welding skills, using SMAW, FCAW and GTAW techniques.

Career Major Goals:

Upon successful completion of this career major, the student should be able to enter the welding field at the entry level, according to their individual skill and self-motivation.

Upon achieving the goals of this career major, students will:

- Become competent in the fundamental skills of the occupation
- Become qualified for entry into the job market
- Pass at least one Occupational State of Oklahoma certification test
- Demonstrate independence in using problem solving and critical thinking techniques in completing all work assignments
- Develop the ability to work with limited or no supervision
- Accept and abide by the rules and regulations established by the school and/or place of employment

Related Career Opportunities:

- Structural Welder
- Pipe Welder
- Combo Welder
- Pipefitter
- Welder's Helper
- Production Welder

Career Major Objectives:

After successful completion of this career major, the student will be able to:

- Perform various cutting operations with oxy-acetylene cutting equipment
- Perform shielded metal arc welding (SMAW) operations on steel in all standard positions
- Perform gas tungsten arc welding (GTAW) operations on a variety of metals in all standard positions
- Perform gas metal arc welding (GMAW) operations on a variety of metals in all standard positions
- Perform flux cored arc welding (FCAW) operations on a variety of metals in all standard positions
- Interpret welding related blueprints
- Layout and fit a welding project from a sketch or drawing
- Operate welding related equipment commonly found in the welding industry

Career Major Course Sequence:

- HS Student and Part-time Adult (Year One): Course Sequence I
- HS Student and Part-time Adult (Year Two): Course Sequence II
- Full-time Adult (Year One): Course Sequence I and II

**DESCRIPTION OF COURSES
SEQUENCE I**

<u>Course #</u>	<u>Course Name</u>	<u>HST</u>	<u>HSL</u>	<u>ADT</u>	<u>ADL</u>
TI01619	Intro to Welding & Cutting Processes	30	60	30	60
This is an introduction to basic welding safety, math, hand tools, power tools, blueprints, rigging, communication skills and employability skills. Also an introduction to uses of safety equipment, protective clothing, and procedures for cutting metals are included. This course identifies oxyfuel cutting equipment and setup procedures, safety requirements for oxyfuel cutting, how to light, adjust and turn off equipment. Instruction on cutting techniques, straight line piercing, bevels, washing and gouging is also given.					
TI00088	Welding Detail Drawings	10	20	10	20
This course is an introduction to identifying and understanding welding detail drawings. The course describes lines, fills, object views, dimensioning on drawings, use of notes and the bill of materials. Also given is an introduction to the different welding symbols, different types of fillet welds, groove welds, non-destructive examination symbols, how to read welding symbols on drawings, specifications and welding procedures.					
TI00756	Metal Preparation and Heat Treatments	5	25	5	25
This course provides information on to how to clean and prepare all types of base metals for cutting and welding. The course explains preheating, interpass temperature control, and postheating procedures that sometimes need to be done to preserve weldment ductility, and weld quality. It introduces students to the equipment used for heat treatment of metals.					
TI00761	GMAW/FCAW Equipment and Setup	5	10	5	10
This course is an introduction to safety procedures for GMAW and FCAW equipment and explains the filler metals and shielding gases used to perform GMAW and FCAW. It also covers equipment setup and operations.					

TI00381	Metal Characteristics and Properties	10	20	10	20
This course is an introduction to physical characteristics, mechanical properties, composition and classification of common ferrous and nonferrous metals. The course covers visual inspection, and x-ray fluorescent spectrometry methods used to identify metals.					
TI00382	Weld Quality	5	10	5	10
This course is an introduction to codes that govern welding. The course identifies and explains weld imperfections and causes, examination practices, qualification tests and the importance of quality welds.					
TI00753	Air Carbon Arc Cutting and Gouging	5	10	5	10
This course is an introduction to air carbon arc cutting equipment and procedures. The course covers how to identify electrodes and safe operations of equipment. Instructions in performing air carbon arc welding and gouging work assignments are also given in the course.					
TI00087	Plasma Arc Cutting	5	10	5	10
This course is an introduction to plasma arc cutting equipment and procedures. This course covers safe amperage, gas pressure, and flow rate, plasma arc cutting methods for piercing, slotting, squaring, and beveling metals.					
TI00760	Welding Blueprints	5	10	5	10
This course is an introduction to basic blueprint terms, components and symbols, types of blueprint drawings (civil, architectural, structural, mechanical, plumbing/piping and electrical), and interpretation of drawing dimensions and specifications.					
TI00086	Welding Joint Fit Up and Adjustment	5	10	5	10
This course is an introduction to identifying and explaining job code specifications, use of fit-up gauges and measuring devices to check fit-up and alignment, the use of plate and pipe fit-up and alignment tools to properly prepare joints. The course introduces steps to check for joint misalignment of poor fit.					
TI00083	GTAW Equipment & Filler Materials	5	10	5	10
This course is an introduction to GTAW safety, identification of uses of GTAW equipment, filler metals and shielding gases and setup of equipment.					
TI00387	GTAW Plate	20	40	20	40
This course is an introduction in how to pad in all positions using GTAW and carbon steel filler metal. Students will learn how to make multipass V-butt open-groove weld with carbon steel filler metal in the 1G, 2G, 3G, and 4G positions.					
TI00090	SMAW Equipment & Setup	5	10	5	10
This course is an introduction to SMAW and welding safety, how to connect welding current and set up arc welding equipment. The course covers the importance of tools used to clean welds.					
TI00089	SMAW Electrodes	5	10	5	10
This course is an introduction to electrode characteristics and different types of filler metals. It describes the role of the American Welding Society (AWS) and the American Society of Mechanical Engineers (ASME). The course covers safety storage and control of filler metals and identifies the use of codes.					
TI00401	SMAW Beads & Fillet Welds	40	80	40	80
This course is an introduction to the preparation and setup of arc welding equipment and the processes of striking an arc. It also covers how to make stringers, weave, overlapping beads and fillet welds.					

TI00802 Workforce Staging 0 30 0 30

This course is designed to be delivered as an integrated component within the courses taken by the individual student. The course is designed for the development of leadership, personal development and employability skills.

Sequence I Subtotal Hours:	Theory	Lab	Total
High School Student:	160	365	525
Adult Student:	160	365	525

**DESCRIPTION OF COURSES
SEQUENCE II**

<u>Course #</u>	<u>Course Name</u>	<u>HST</u>	<u>HSL</u>	<u>ADT</u>	<u>ADL</u>
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TI00093	SMAW Open V Groove Welds	40	80	40	80
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This course is an introduction to open V-groove welds and how to set up welding equipment for making an open V-groove weld. Procedures for making flat, vertical, horizontal, and overhead open V-groove welds are covered.

TI00386	GMAW Plate	20	40	20	40
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This course covers how to build a pad of stringer and weave beads using filler metals and shielding gas. Students will learn how to perform GMAW multi-pass fillet welds on plate in multiple positions.

TI00385	FCAW Plate	20	40	20	40
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This course covers how to build a pad of stringer and weave beads using filler metals and shielding gas. Students will learn how to perform FCAW multi-pass fillet welds on plate in multiple positions.

TI01435	GTAW Aluminum Plate	15	30	15	30
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This course is an introduction to open root V-groove welding of aluminum plate in the 2G, 5G and 6G positions

TI00405	FCAW Pipe	15	30	15	30
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This course is an introduction in how to set up FCAW equipment, the procedures and techniques used to make V-groove pipe welds with FCAW in the 1G-ROTATED, 2G, 5G, and 6G positions.

TI00092	SMAW Open Root Pipe Welds	35	70	35	70
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This course is an introduction to open-root welds and how to set up welding equipment for making open-root welds. It provides the procedures for making 1G, 2G, 5G, and 6G open-root pipe welds.

TI00082	GTAW Carbon Steel Pipe	30	60	30	60
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This course is an introduction in how to set up GTAW equipment, procedures and techniques used to make V-groove pipe welds with GTAW in the 1G-ROTATED, 2G, 5G and 6G positions.

Sequence II Subtotal Hours:	Theory	Lab	Total
High School Student:	175	350	525
Adult Student:	175	350	525

Career Major Total:	Theory	Lab	Total
High School Student:*	335	715	1050
Adult Student:	335	715	1050

* High school students may complete this career major in an adult enrollment status if necessary. Please see your instructor or counselor for details.

Evaluation Policy:

Employability Grades (100 points per week; 40% of final grade)

The employability skills grade is based on 20 points per day (which may include: attitude, attendance, safety, punctuality, cooperation, participation, clean-up, class preparation, school/classroom rules, and time management). Points will be deducted if these responsibilities are not met at the instructor's discretion. Students will be allowed to make up unearned employability points for **excused** absences only. Full credit will be given for assignments/tests that have been made up due to excused absences only (see Student Handbook).

Performance Grades (40% of final grade)

- While daily grades reflect the student's work attitude, progress chart grades reflect the student's ability to perform the tasks assigned in the various welding processes. Upon completion of each task, the student's performance will be evaluated using a check list provided to each student. No performance grade below 85% will be accepted by the instructor.

Test Grades (20% of final grade)

- Theory tests will be given at regular intervals. These will be objective tests designed to test the student's technical knowledge. All safety tests must pass with 100% accuracy.
- Skill tests will be given at the end of most units to make sure students are developing the skills necessary for entry into the welding field. Skill tests will not only count as weld grades, but will also be counted as a test grade. Each will be worth 100 points.
- Students who do not reach skill tests on the progress chart or do not complete them by the end of the grading period will receive a "0" for both weld grade and test grade.
- If a student has time in the next grade period to complete a skill test that was missed, they may do so, but only for competency profile requirements; no test grade will be given.

Final Grade (9 Weeks Period)

9-weeks grade will be calculated by averaging grades in each category and summing each category according to their assigned weight. Progress reports will be sent to home schools at six and twelve-week intervals each semester as required or requested. Grades are accessible on-line at <http://sonisweb.greatplains.edu/studsect.cfm>

Grading Scale:

The grading scale as adopted by the Board of Education is as follows:

- A = 90 – 100
- B = 80 – 89
- C = 70 – 79
- D = 60 – 69

- F = Below 60
- W = Withdrawn
- I = Incomplete
- N = No Grade (Refer to Student Handbook)

Make-Up Work Policy:

All Make-Up Work Is The Responsibility Of The Student. Make-up work will be handled as specified in the Student Handbook. Please be sure to read and understand all student policies, especially make-up of assignments, tests and employability due to absences. Students should always arrange for any make-up work with the instructor as per the Student Handbook. Students should keep track of his or her progress and grades.

Attendance Policy:

For specific information related to attendance and tardiness refer to the Student Handbook. Students should keep a written record of their absences and tardiness.

Course Requirements and Expectations:

The general course requirements and expectations include:

- Teaching methods consist of lecture and “hands on” projects.
- The student must demonstrate the ability to apply safety to all aspects of the welding field.
- All students must adhere to the policies and procedures in the GPTC Student Handbook.
- It is highly recommended that the student have purchased or attained the required tools and equipment for employment as a welder. Possessing a valid driver’s license will also benefit the student and is recommended.

Student Behavior Includes:

- All students will wear welding class uniforms. Uniforms will be worn from the beginning of the class period to the end of the class period, or until shop cleanup is finished. This includes during any period of time when a student may be out of the shop or classroom 155.
- Overalls will be worn properly and not tied around the waist at any time. Overalls in need of repair will be fixed within 3 days or replaced. Students may not alter their overalls in any way without the specific permission of the instructor. Overalls must fit properly or be replaced.
- Students will also be expected to wear their student ID badge any time they are on campus, this includes break times. Student ID badges will not be altered in any way. Students will wear their overalls properly while on break.
- Students will wear boots that completely cover the feet, laced properly. Students will wear clear safety glasses at all times while in the shop environment. Clear prescription glasses will be permitted. Safety glasses may not be altered without the specific permission of the instructor.
- Shorts will not be permitted at any time. Full length pants are to be worn as this is a working environment. Tank tops or sleeveless shirts are not to be worn at any time. No piercing at all visible shall be worn at any time.

NOTE: For additional information or questions regarding the GPTC School policies and procedures, please refer to the Student Handbook and/or the Instructor.

Industry Alignments:

- National Center for Construction Education and Research (NCCER)
- American Welding Society (AWS)
- National Organization for Career and Technical Industry (NOCTI)

Certification Outcomes:

Tier 1 – Certifications Recognized, Administered and/or Endorsed by Industry

- DOL: Oklahoma Welder Certification (4404)

Tier 2 – Certifications Endorsed by Industry Organizations

- ODCTE: Cutting Process Operator (4305)
- ODCTE: Flux Cored Arc Welder (4303)
- ODCTE: Gas Metal Arc Welder (4302)
- ODCTE: Gas Tungsten Arc Welder (4304)
- ODCTE: Shielded Metal Arc Welder (4301)

Tier 7 – National Career Readiness Certificate in Applied Mathematics, Locating Information and Reading for Information:

- Platinum Level – 6 or above in all three areas
- Gold Level – 5 or above in all three areas
- Silver Level – 4 or above in all three areas
- Bronze Level – 3 or above in all three areas

CIP Code and SOC Code Crosswalk:

- CIP Code – 48.0508
- SOC Code – 51-4121.06

Instructional Materials:

Students are not required to purchase textbooks or supplemental reference materials.

Textbooks:

Graves, W.V. The Pipe Fitters Blue Book. 0970832109. Graves Publishing, 1973.

Molnar, George A. Practical Guide to Butt Weld Pipe Fitting. Tech Aid Books, 1982.

National Center for Construction Education and Research (NCCER). Welding Level 1. 0-13-102574-0. Upper Saddle River: Pearson Prentice Hall, 2003.

National Center for Construction Education and Research (NCCER). Welding Level 2. 0-13-102581-3. Upper Saddle River: Pearson Prentice Hall, 2003.

Welding Class Student Handbook.