Welding Technology

Program of Studies
2016-2017

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Kentucky Department of Education
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Program Area Course Title	Post-Secondary Connection	Valid Course Code	Recommended Grade Level				Recommended Credit
			9	10	11	12	
Basic Blueprint Reading	BRX 120	499920	X	X	X	X	.5
Basic Welding A	WLD 151	480503	X	X	X	X	.5
Blueprint Reading for Welding	WLD 170	480505	X	X	X	X	1
Cooperative Education (Welding)	WLD 299	480541				X	1
Cutting Processes	WLD 110	480501	X	X	X	X	1
Gas Tungsten Arc Welding	WLD 130	480525		X	X	X	1
Gas Metal Arc Welding	WLD 140	480522	X	X	X	X	1
GMAW Groove Lab	WLD 143	480533		X	X	X	1
Gas Tungsten Arc Welding Pipe Lab A	WLD 235	480538		X	X	X	1
GMAW Aluminum Lab	WLD 145	480534		X	X	X	.5
GMAW Pipe Lab A	WLD 245	480540		X	X	X	1
GTAW Groove Lab	WLD 133	480530		X	X	X	1
Internship (Welding)	WLD 298	480544			X	X	1-3
Oxy-Fuel Systems	WLD 100	480523	X	X	X	X	1
Shielded Metal Arc Welding Pipe Lab A	WLD 227	480536		X	X	X	1
Shielded Metal Arc Welding Pipe Lab B	WLD 229	480537		X	X	X	1
Shielded Metal Arc Welding (SMAW)	WLD 120	480521	X	X	X	X	1
SMAW Groove Welds with Backing Lab	WLD 123	480528		X	X	X	1
SMAW Open Groove Lab	WLD 225	480535		X	X	X	1
Special Problems (Welding)	WLD 198	480595		X	X	X	1
Special Topics - Welding	IEX 293	480599	X	X	X	X	.5 - 1
Welding Certification	WLD 220	480507		X	X	X	1

COMPLEMENTARY OR ADVANCED COURSEWORK BEYOND THE WELDING PATHWAY(s)
Upon completion of a pathway, additional coursework to enhance student learning is encouraged. Credits earned in Advanced or Complementary Coursework "Beyond the Pathway" may not be substituted for pathway courses in order to achieve Preparatory or Completer status.
• 480536 Shielded Metal Arc Welding Pipe Lab A
• 480507 Welding Certification
• 480599 Special Topics-Welding
• Career Options
• JAG Courses

Overview of Welding Technology

Purpose
The vision of Welding Technology is to promote safety and performance standards, enhance leadership, and provide relevant curriculum vital to the education of all students.

Welding Technology will:

- Operate as the venue for nationally recognized industry standard training.
- Provide a critical link in school to employment or postsecondary education.
- Develop stronger relationships with the community in terms of mutual advocacy, cooperative field experiences, employment placement, and support for relevant student organizations and competitions.
- Represent an important component in the education of all students.
- Require and promote critical thinking and problem solving.
- Offer an up to date curriculum based on standards that adapt to changes in the industry.
- Integrate academic skills to insure that students develop written and verbal communications skills, computational skills, and scientific/math problem-solving skills.

Career Pathways

- *Welder-Entry Level*
- *Combination Arc Welder*
- *Gas Metal Arc Welder*
- *Shielded Metal Arc Welder*
- *Welding Technology TRACK*
- *Skilled Trades Welding TRACK*

Standards Based Curriculum
The Welding Technology Curriculum is composed of standards-based competencies. All Welding Technology programs incorporate industry and academic standards thus increasing the student's qualifications toward successful employment.

Alignment of the Welding Technology curriculum with nationally recognized industry standards and the academic standards provides optimal preparation for students to acquire an industry certification.

Communities understand that this preparation provides better career opportunities for students and the demands of today's workforce for the 21st century.

Kentucky Occupational Skill Standards
The Kentucky Occupational Skill Standards are the performance specifications that identify the knowledge, skills, and abilities an individual needs to succeed in the workplace. Identifying the necessary skills is critical to preparing students for entry into employment or postsecondary education. These standards describe the necessary occupational, academic, and employability skills needed to enter the workforce or post-secondary education in specific career areas. There is an ongoing effort to continue to refine these standards by which exemplary Career and Technical Education Programs are evaluated and certified. This helps insure that curriculum meets industry specifications.

Link to KOSSA Skill Standards documents via:
http://education.ky.gov/CTE/kossa/Pages/KOSSAStandardsDocs.aspx

Valid KOSSA and Industry Certification for Career Readiness
The Valid List of KOSSA and Industry Certifications for Career Readiness can be viewed via the following link: http://education.ky.gov/CTE/kossa/Pages/ValidKOSSAList.aspx. The valid list is reviewed annually through the established process and publishes by June 1 for the corresponding academic year.

Work Based Learning

Cooperative experience, internships, shadowing and mentoring opportunities provide depth and breadth of learning in the instructional program and allow students to apply the concepts learned in the classroom. The Work Based Learning Manual is available on the KDE webpage:
http://education.ky.gov/CTE/cter/Pages/WBL.aspx

Student Organizations and Competitions

Participation in SkillsUSA competitions provides a vehicle for students to employ higher order thinking skills, interact with high-level industry representatives and enhance leadership skills through participation in regional, state and national competitive events and activities.

WELDING TECHNOLOGY
CAREER PATHWAYS
2016-2017

WELDER-ENTRY LEVEL
CIP 48.0508.01

PATHWAY DESCRIPTION: An Entry Level Welder demonstrates the ability to assist lead welders in the fabrication of steel and metal structures. Must be adept at performing basic welding functions and calculating dimensions as well as operating power equipment, grinders and other related tools. Must be proficient in reading and interpreting basic blueprints and following work procedure specifications (WPS).

BEST PRACTICE COURSES	**EXAMPLE ILP-RELATED CAREER TITLES**
Foundational Skills Necessary for Career-Ready Measure: (KOSSA/Industry Certification) *Complete **(3) THREE CREDITS:*** • 480505 Blueprint Reading for Welding OR 499920 Basic Blueprint Reading* AND 480503 Basic Welding A* • 480523 Oxy-fuel Systems OR 480501 Cutting Processes • 480521 Shielded Metal Arc Welding (SMAW) *Choose (1) **ONE CREDIT** from the following:* • 480522 Gas Metal Arc Welding • 480533 GMAW Groove Lab • 480528 SMAW Groove Welds with Backing Lab • 480535 SMAW Open Groove Lab • 480525 Gas Tungsten Arc Welding • 219901 Introduction to Engineering Design ***(PLTW)*** • 480541 Cooperative Education (Welding) OR 480544 Internship (Welding) Note: (PLTW) courses require an agreement between Project Lead the Way and the Local School District. Note: (*) Indicates half-credit (.5) course	Combination Welder Pipe Welder Ironworker Tungsten Inert Gas (TIG) Welder Certified Welding Inspector (CWI) Certified Welding Educator (CWE) Welding Engineer Structural Engineer Mechanical Engineer

WELDING TECHNOLOGY
CAREER PATHWAYS
2016-2017

COMBINATION ARC WELDER
CIP 48.0508.03

PATHWAY DESCRIPTION: Combination Arc Welders set up and align materials to be joined by either the Shielded Metal Arc (SMAW) or Gas Metal Arc welding process. Welds together metal components of products in an assembly setting, such as automobiles, appliances, and aircraft, as specified by layout, blueprints, diagram, work order, procedures, or oral instructions, using the Gas Metal Arc welding process. Welds together structural steel components in a construction setting using the Shielded Metal Arc (SMAW) process. Must be knowledgeable of the required geometry and physical properties of the materials to be welded and capable of passing required weld certifications.

BEST PRACTICE COURSES	**EXAMPLE ILP-RELATED CAREER TITLES**
Foundational Skills Necessary for Career-Ready Measure: (KOSSA/Industry Certification) *Complete **(4) FOUR CREDITS:*** • 480505 Blueprint Reading for Welding OR 499920 Basic Blueprint Reading* AND 480503 Basic Welding A* • 480523 Oxy-fuel Systems OR 480501 Cutting Processes • 480521 Shielded Metal Arc Welding (SMAW) • 480522 Gas Metal Arc Welding • 480541 Cooperative Education (Welding) OR 480544 Internship (Welding) Note: (*) Indicates half-credit (.5) course	Combination Welder Pipe Welder Ironworker Tungsten Inert Gas (TIG) Welder Certified Welding Inspector (CWI) Certified Welding Educator (CWE) Welding Engineer Structural Engineer Mechanical Engineer

WELDING TECHNOLOGY
CAREER PATHWAYS
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GAS METAL ARC WELDER
CIP 48.0508.04

PATHWAY DESCRIPTION: Welds together metal components of products, such as pipelines, automobiles, boilers, ships, aircraft, and mobile homes, as specified by layout, blueprints, diagram, work order, welding procedures, or oral instructions, using electric arc-welding equipment (MIG) process. Knowledgeable in properly setting the gas metal arc welding equipment for the product material required.

BEST PRACTICE COURSES	**EXAMPLE ILP-RELATED CAREER TITLES**
Foundational Skills Necessary for Career-Ready Measure: (KOSSA/Industry Certification) *Complete **(3) THREE CREDITS:*** • 480505 Blueprint Reading for Welding OR 499920 Basic Blueprint Reading* AND 480503 Basic Welding A* • 480523 Oxy-fuel Systems OR 480501 Cutting Processes • 480522 Gas Metal Arc Welding *Choose (1) **ONE CREDIT** from the following:* • 480533 GMAW Groove Lab • 480540 GMAW Pipe Lab A • 480525 Gas Tungsten Arc Welding • 480534 GMAW Aluminum Lab* • 219901 Introduction to Engineering Design ***(PLTW)*** • 480541 Cooperative Education (Welding) OR 480544 Internship (Welding) Note: (PLTW) courses require an agreement between Project Lead the Way and the Local School District. Note: (*) Indicates half-credit (.5) course	Combination Welder Pipe Welder Ironworker Tungsten Inert Gas (TIG) Welder Certified Welding Inspector (CWI) Certified Welding Educator (CWE) Welding Engineer Structural Engineer Mechanical Engineer

WELDING TECHNOLOGY
CAREER PATHWAYS
2016-2017

SHIELDED METAL ARC WELDER
CIP 48.0508.06

PATHWAY DESCRIPTION: Shielded metal arc welders work primarily with heavy plate steel and pipe welding in the construction industry, including the building construction and pipeline industries. The oil and gas industry also uses shield metal arc welders for both construction and repair of production facilities. They must set up equipment and welds parts, using the shielded metal arc process (SMAW) while being knowledgeable of the required geometry, physical properties of weld shrinkage and welding techniques.

BEST PRACTICE COURSES	**EXAMPLE ILP-RELATED CAREER TITLES**
Foundational Skills Necessary for Career-Ready Measure: (KOSSA/Industry Certification) *Complete **(3) THREE CREDITS:*** • 480505 Blueprint Reading for Welding OR 499920 Basic Blueprint Reading* AND 480503 Basic Welding A* • 480523 Oxy-fuel Systems OR 480501 Cutting Processes • 480521 Shielded Metal Arc Welding (SMAW) *Choose **(1) ONE CREDIT** from the following:* • 480528 SMAW Groove Welds with Backing Lab • 480535 SMAW Open Groove Lab • 480537 Shielded Metal Arc Welding Pipe Lab B • 219901 Introduction to Engineering Design ***(PLTW)*** • 480541 Cooperative Education (Welding) OR 480544 Internship (Welding) Note: (PLTW) courses require an agreement between Project Lead the Way and the Local School District. Note: (*) Indicates half-credit (.5) course	Combination Welder Pipe Welder Ironworker Tungsten Inert Gas (TIG) Welder Certified Welding Inspector (CWI) Certified Welding Educator (CWE) Welding Engineer Structural Engineer Mechanical Engineer

WELDING TECHNOLOGY
CAREER PATHWAYS
2016-2017

WELDING TECHNOLOGY TRACK
CIP 48.0500.99

PATHWAY DESCRIPTION:

The Tech Ready Apprentices for Careers in Kentucky (TRACK) youth pre-apprenticeship program is a partnership between the Kentucky Department of Education's Office of Career and Technical Education and the Kentucky Labor Cabinet to provide secondary students with career pathway opportunities into employers who offer Registered Apprenticeship programs.

Employers are able to tailor the program for their specific needs and select the Career and Technical Education courses and students for their apprenticeship pathway. Employers benefit by gaining future employees that have a good foundation and an interest in that occupation. Additionally, it enables students to receive a nationally recognized credential.

Successful completion is determined by the employer and the student will be awarded an industry certification through The Kentucky Labor Cabinet and all on-the-job hours worked will be counted towards the registered apprenticeship.

BEST PRACTICE COURSES	**EXAMPLE ILP-RELATED CAREER TITLES**
Foundational Skills Necessary for Career-Ready Measure: (KOSSA/Industry Certification) *Complete **(4) FOUR CREDITS:*** • A minimum of four (4) courses chosen from the partnering technical center's manufacturing course offerings. These courses are chosen by the employer sponsoring the Registered Apprenticeship. The employer must provide a student co-op opportunity.	Combination Welder Pipe Welder Ironworker Tungsten Inert Gas (TIG) Welder Certified Welding Inspector (CWI) Certified Welding Educator (CWE) Welding Engineer Structural Engineer Mechanical Engineer

The specifics of the TRACK program vary and interested parties will need to confer with the Office of Career and Technical Education for the implementation process. There are no costs involved in the TRACK program except for student employee wages. For more information, please refer to: http://education.ky.gov/CTE/cter/Pages/TRACK.aspx

WELDING TECHNOLOGY
CAREER PATHWAYS
2016-2017

SKILLED TRADES WELDING TRACK
CIP 48.0508.99

PATHWAY DESCRIPTION: The Welding TRACK is designed as a pre-apprenticeship pathway for students to enter Registered Apprenticeship training programs. Students must successfully complete the four course sequence and 8 safety modules. In addition, each student must pass the Kentucky Department of Transportation (KY DOT) written exam and the KY DOT 3G performance exam OR AWS 2F exam OR AWS Sense exam. Upon completion the student will receive a pre-apprenticeship industry certification issued by the Kentucky Labor Cabinet. This certification will be recognized by participating partners for an interview and possible credit upon acceptance. Credit is at the discretion of the training organization. For more information or a list of participating organizations, please visit: http://education.ky.gov/CTE/cter/Pages/TRACK.aspx

BEST PRACTICE COURSES	**EXAMPLE ILP-RELATED CAREER TITLES**
Foundational Skills Necessary for Career-Ready Measure: (KOSSA/Industry Certification) ***Complete (4) FOUR REQUIRED CREDITS:*** • 480522 Gas Metal Arc Welding (GMAW) • 480521 Shielded Metal Arc Welding (SMAW) • 480528 SMAW Groove Welds with Backing Lab • 480535 SMAW open Groove Lab ***Additional coursework to ENHANCE pathway:*** • 480525 Gas Tungsten Arc Welding • 480530 GTAW Groove Lab • 480538 Gas Tungsten Arc Welding Pipe Lab A • 480595 Special Problems (Welding)	Combination Welder Pipe Welder Ironworker Tungsten Inert Gas (TIG) Welder Certified Welding Inspector (CWI) Certified Welding Educator (CWE) Welding Engineer Structural Engineer Mechanical Engineer

	COLLEGE/UNIVERSITY:	**Technical College(KCTCS)**				CLUSTER:	**Manufacturing**				
		Kentucky Universities				PATHWAY:	**Welding**				
	HIGH SCHOOL (S):	**KY ATC/CTC**				PROGRAM:	**Welding Technology**				
	GRADE	ENGLISH	MATH	SCIENCE	SOCIAL STUDIES	REQUIRED COURSES RECOMMENDED ELECTIVE COURSES OTHER ELECTIVE COURSES CAREER AND TECHNICAL EDUCATION COURSES			CREDENTIAL CERTIFICATE DIPLOMA DEGREE	SAMPLE OCCUPATIONS
SECONDARY	9	English I	Algebra I	Earth Space Science	World History	Health and PE	Basic Blueprint Reading-470302	Basic Welding A - 470303		
	10	English II	Geometry	Biology I	World Civics	History and Appreciation of Fine Arts	**Cutting Processes-480501**	**Shielded Metal Arc Welding-480521**		
	11	English III	Algebra II	Physics or Chemistry	U.S. History	**Foreign Language**	**Shielded Metal Arc Welding-Groove-480528**	**Shielded Metal Arc Welding-Open Groove-**	**2F Industry Certification**	**Sheilded Metal Arc Welder/ ARC Welder**
	12	English IV	Math Elective	**Computer Aided Drafting (elective)**	**World Geography**	**Gas Metal Arc Welding-480522**	**Gas Tungsten Arc Welding/Lab-480525**	**GMAW Groove Lab-480533**	**KY DOT 3-G Certification /TRACK Pre-Apprenticeship/ KOSSA**	**Combination Welder/ Welder Entry Level**
POSTSECONDARY	Year 13	**ENG 101 Writing I**	**MT 110 Applied Mathematics**	**ASTR 104 Astronomy**	**College Chemistry**	**PSY 100 Intro Psychology**	**Process Principles**	**Occupation Safety**	**Certified Combination Arc Welder**	**Industry Apprenticeship Boilermaker/ Pipe Fitter**
	Year 14	**Math**	**WLD 225 SMAW Open Groove Lab**	**WLD 221 Certification Lab**	**HIS 109 US History**	**ENG 200 Intro/Literature**	**Materials Science**		**Associates Degree in Applied Science**	**Certified Welder Inspector/Welding Technician**
	Year 15	**PHY 195 METHODS OF ENG. PHYSICS**	**MAT 250 CALCULUS**	**PHY 236 UNIV. PHYSICS I**	**MAT 308 CALCULUS II**	**ENG 102 ENGLISH COMP. II**	**CIV 102 WORLD CIV. II**	**TECHNICAL ELECTIVE**		
	Year 16	**PHY 140 INTRO. COMPUTING APPS.**	**PHY 255 UNIV. PHYSICS II**	**PHY 259 STATICS**	**MAT 309 CALCULUS III**	**MAT 411 DIFFERENTIAL S EQTNS.**	**PHY 264 LINEAR CIRCUITS I**	**PHY 330 DYNAMICS**	**B.S. Welding Engineering**	**Welding Metallurgist**
	Year 17	**PHY 344 FLUID MECHANICS**	**PHY 370 INTRO. MODERN PHYSICS**	**CHE 201 GEN. COLLEGE CHEM. I**	**HUM 211 HUMANITIES**	**ITD 102 CAD APPLICATIONS**	**PHY 346 HEAT TRANSFER**	**PHY 375 MATERIALS SCIENCE**	**PHY 390 ENGR. MEASUREMENT**	**TECH.ELECTIVE**
	Year 17	**PHY 359 MECHANICS OF MATERIALS**	**PHY 470 OPTICS**	**PHY 498 SENIOR ENGR. DESIGN I**	**ECO 231 PRINC. OF MICROECONOMICS**	**PHY 499 SENIOR ENGR. DESIGN II**	**TECHNICAL ELECTIVE**	**MAT DEPTH ELECTIVE**	**FREE ELECTIVE**	**HUM/FA ELEC.**
								BACHELORS DEGREE ENGINEERING	**Western Kentucky UNIVERSITY**	**ENGINEER**

Other Elective Courses

Career and Technical Education Courses

Credit-Based Transition Programs (e.g. Dual/Concurrent Enrollment, Articulated Courses, 2+2+2)

(◆=High School to Comm. College) (● =Com. College to 4-Yr Institution) (■ = Opportunity to test out)

Mandatory Assessments, Advising, and Additional Preparation

TECHNICAL COLLEGE CREDIT GIVEN THROUGH THE KCTCS DUAL ENROLLMENT PROGRAM

Certificate given through the Warren County Area Technology Center

Degree given through the Bowling Green Technical College KCTCS

DEGREE GIVEN THROUGH THE MURRAY STATE UNIVERSITY

Funded by the U. S. Department of Education
(V051B020001)
Revised Jan. 2005
October, 2006-CTE/Kentucky

Basic Blueprint Reading
Valid Course Code: 499920

Course Description: This course presents basic applied math, lines, multi-view drawings, symbols, various schematics and diagrams, dimensioning techniques, sectional views, auxiliary views, threads and fasteners, and sketching typical to all shop drawings. Safety will be emphasized as an integral part of the course.

Content/Process

Students will:

1. Introduction and math review (fractions and decimals).
2. Identify the alphabet of lines.
3. Identify multiple views.
4. Arrange multiple views.
5. Arrange two-view drawings.
6. Identify one-view drawings.
7. Arrange and identify auxiliary views.
8. Demonstrate the use of size and location dimensions.
9. Demonstrate proper dimensions of cylinders and arcs.
10. Size dimensions of holes and angles.
11. Locate dimensions for centering of holes, points, and centers.
12. Interpret the base line dimensions on drawings.
13. Identify half, full, and removed sections.
14. Identify electrical schematic and diagram symbols.
15. Identify welding symbols and equipment.
16. Interpret ordinate and tabular dimensions.
17. Set tolerances using geometric dimensioning techniques.
18. Sketch parts with irregular shapes.
19. Sketch oblique views of various parts.
20. Sketch and dimension shop drawings.
21. Dimension parts using shop notes.
22. Calculate tolerances.
23. Identify labeling of various screw threads.
24. Calculate tapers and machined surfaces.
25. Interpret connections and flow of various electrical, hydraulic, and pneumatic schematics and diagrams.

Connections

- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: BRX 120
- CTSO - SkillsUSA

Basic Welding A
Valid Course Code: 480503

Course Description: Students are introduced to welding, cutting processes, and related equipment. Basic setup, operation, and related safety are applied.

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on integrity, responsibility, quality, discipline and teamwork.
4. Setup and operate various welding and cutting equipment.

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 151
- CTSO - SkillsUSA

Blueprint Reading for Welding
Valid Course Code: 480505

Course Description: This course provides a study of occupationally specific prints for welders. Advanced study of multi-view drawings, assembly drawings, datum dimensions, numerical control drawings, sheet metal prints, castings and forgings, instrumentation and control charts and diagrams, working drawings, geometric dimensioning and tolerance and use of reference materials and books are included. Occupational specifics including welding drawings, symbols, joint types, grooves, pipe welding symbols, testing symbols, and specification interpretations are stressed.

Prerequisite: Consent of Instructor

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on integrity, responsibility, quality, discipline and teamwork.
4. Interpret lines.
5. Interpret views to include AWS (ISO symbols optional).
6. Interpret conventional and datum line dimensions.
7. Interpret and apply tolerances.
8. Interpret section lines.
9. Interpret sectioning.
10. Interpret and apply American Welding Society welding symbols.
11. Interpret and apply International Standard welding symbols.
12. Draw shop sketches.
13. Interpret various types of prints to include fabrication, repair, structural steel, and piping prints.
14. Read and interpret blueprints.
15. Complete projects from prints.
16. Practice controlling distortion.
17. Practice repairing distortion.

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 170
- CTSO - SkillsUSA

Cooperative Education (Welding)
Valid Course Code: 480541

Course Description: Cooperative Education provides supervised on-the-job work experience related to the students' educational objectives. Students participating in the Cooperative Education program receive compensation for their work.

Prerequisite: Consent of Instructor

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on integrity, responsibility, quality, discipline and teamwork.
4. Gain career awareness and the opportunity to test career choice(s).
5. Receive work experience related to career interests prior to graduation.
6. Integrate classroom studies with work experience.
7. Receive exposure to facilities and equipment unavailable in a classroom setting.
8. Increase employability potential after graduation.
9. Earn funds to help finance education expenses.

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 299
- CTSO - SkillsUSA

Cutting Processes
Valid Course Code: 480501

Course Description: Students will obtain a working knowledge of various cutting processes used by the welding industry. Skills will include, but are not limited to, safety, theory of operation, setup and operating techniques, troubleshooting, and making minor equipment repairs, terms and definitions, identification, evaluation, repair and prevention of discontinuities of cut surfaces. Also included are oxy-fuel cutting, plasma arc cutting, exothermic cutting, air carbon arc cutting, shielded metal arc cutting, and mechanical cutting processes.

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on integrity, responsibility, quality, discipline and teamwork.
4. Practice cutting processes safety procedures.
5. Discuss the welding theories of operation.
6. Discuss setup and operating techniques.
7. Apply principles of troubleshooting and making minor equipment repairs.
8. Identify, evaluate, repair, and prevent reoccurrence of discontinuities of cut surfaces.

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 110
- CTSO - SkillsUSA

Gas Tungsten Arc Welding
Valid Course Code: 480525

Course Description: This course covers identification, inspection, and maintenance of GTAW machines; identification, selection and storage of GTAW electrodes; principles of GTAW; effects of variables on the GTAW process; and metallurgy. This course also teaches the theory and application of Plasma Arc Cutting.

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on integrity, responsibility, quality, discipline and teamwork.
4. Use lab equipment and tools.
5. Apply principles of GTAW to weld metals.
6. Set up GTAW systems.
7. Apply knowledge of effects of variables to weld plate and pipe.
8. Apply knowledge of basic metallurgy to control chemical, physical, and mechanical characteristics of non-ferrous metals.
9. Identify and select GTAW electrodes.
10. Identify and select GTAW fill rods.
11. Clean metals with solvent or cleaning fluids.
12. Set up and operate plasma arc cutting equipment.

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 130
- CTSO - SkillsUSA

Gas Metal Arc Welding
Valid Course Code: 480522

Course Description: This course covers identification, inspection, and maintenance of GMAW machines; identification, selection and storage of GMAW electrodes; principles of GMAW; and the effects of variables on the GMAW process. Theory and applications of related processes such as FCAW and SAW and metallurgy are also included. Students learn the practical application and manipulative skills of Gas Metal Arc Welding and the proper safety situations needed in this process. Both ferrous and non-ferrous metals will be covered, as well as various joint designs on plate in all positions.

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with integrity, responsibility, quality, discipline and teamwork.
4. Use lab equipment and tools.
5. Apply principles of GMAW to weld metals including FCAW and SAW.
6. Apply knowledge of the effects of variables of GMAW to weld plate and pipe.
7. Apply knowledge of basic metallurgy to control chemical, physical, and mechanical properties of alloy steels.
8. Identify and select filler materials for GMAW processes.
9. Weld fillet welds in all positions using various transfer modes on steel, stainless steel, and aluminum.

Content/Process – (optional)
Additional content for students in Skilled Trades Welding Track – CIP 48.0508.99

1. Interpret and apply tolerances
2. Interpret and apply American Welding Society welding symbols
3. Draw shop sketches
4. Read and interpret blueprints
5. Interpret lines.
6. Interpret views to include AWS (ISO symbols optional).
7. Interpret conventional and datum line dimensions.
8. Interpret and apply tolerances.
9. Interpret sectioning and section lines.
10. Apply principles of oxy-fuel systems to cut, weld, braze, and braze-weld with oxy-fuel.
11. Apply principles of controlling distortion.
12. Setup components of oxy-fuel equipment and setup procedures.
13. Apply oxy-fuel cutting applications and procedures.
14. Apply oxy-fuel welding applications and procedures.
15. Apply brazing and braze welding principles and applications.

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 140
- CTSO - SkillsUSA

GMAW Groove Lab

Valid Course Code: 480533

Course Description: Students learn the method of operation and application of the Gas Metal Arc Welding process for welding groove welds in both ferrous and non-ferrous plate in all positions using both short circuiting and spray transfer where appropriate.

Prerequisites: Gas Metal Arc Welding - 480522 or Consent of Instructor

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on integrity, responsibility, quality, discipline and teamwork.
4. Weld groove welds on ferrous and non-ferrous plate in all positions with short circuiting and spray transfer where appropriate.

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 143
- CTSO - SkillsUSA

Gas Tungsten Arc Welding Pipe Lab A
Valid Course Code: 480538

Course Description: Students learn the method of operation and application of the Gas Tungsten Arc Welding system for welding of both ferrous and non-ferrous pipe in 2G and 5G positions.

Prerequisites: GTAW Groove Lab - 480530 or Consent of Instructor

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on Integrity, responsibility, quality, discipline and teamwork.
4. Weld pipe (GTAW).

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 235
- CTSO - SkillsUSA

GMAW Aluminum Lab
Valid Course Code: 480534

Course Description: Students learn to weld aluminum using GMAW process. Fillet and groove welds are made in all positions on both plate and pipe. Short circuiting and spray transfers are used where appropriate.

Prerequisites: Gas Metal Arc Welding - 480522 or Consent of Instructor

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on integrity, responsibility, quality, discipline and teamwork.
4. Weld fillet and groove welds on aluminum plate in all positions using GMAW-S.
5. Weld fillet and groove welds on aluminum plate in all positions using spray transfer GMAW.
6. Weld fillet and groove welds on aluminum pipe in all positions.

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 145
- CTSO - SkillsUSA

GMAW Pipe Lab A
Valid Course Code: 480540

Course Description: This course acquaints the student with the operation and application of the Gas Metal Arc System for welding pipe in 2G and 5G positions.

Co-requisite: GMAW Groove Lab - 480533 or Consent of Instructor

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on integrity, responsibility, quality, discipline and teamwork.
4. Weld pipe in 2G and 5G (GMAW).

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 245
- CTSO - SkillsUSA

GTAW Groove Lab
Valid Course Code: 480530

Course Description: Students learn the method of operation and application of the Gas Tungsten Arc Welding process for welding groove welds in both ferrous and non-ferrous plate in all positions.

Prerequisite: Gas Tungsten Arc Welding - 480525 or Consent of Instructor

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on integrity, responsibility, quality, discipline and teamwork.
4. Weld groove welds in ferrous and non-ferrous plate in all positions.

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 133
- CTSO - SkillsUSA

Internship (Welding)
Valid Course Code: 480544

Course Description: The internship provides supervised on-the-job work experience related to the students' education objectives. Students participating in the practicum do not receive compensation.

Prerequisites: Consent of Instructor

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on integrity, responsibility, quality, discipline and teamwork.
4. Gain career awareness and the opportunity to test career choice(s).
5. Receive work experience related to career interests prior to graduation.
6. Integrate classroom studies with work experience.
7. Receive exposure to facilities and equipment unavailable in a classroom setting.
8. Increase employability potential after graduation.

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 298
- CTSO - SkillsUSA

Oxy-Fuel Systems
Valid Course Code: 480523

Course Description: This course provides a working knowledge of: oxy-fuel identification, set-up, inspection, and maintenance; consumable identification, selection and care; principles of operation; and effects of variables for manual and mechanized oxy-fuel cutting, welding, brazing principles and practice, and metallurgy. Shop safety and equipment use are also covered.

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on integrity, responsibility, quality, discipline and teamwork.
4. Practice oxy-fuel welding safety procedures.
5. Use shop equipment and tools.
6. Apply principles of oxy-fuel systems to cut, weld, braze, and braze-weld with oxy-fuel.
7. Apply principles of controlling distortion.
8. Setup components of oxy-fuel equipment and setup procedures.
9. Apply oxy-fuel cutting applications and procedures.
10. Apply oxy-fuel welding applications and procedures.
11. Apply brazing and braze welding principles and applications.

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 100
- CTSO - SkillsUSA

Shielded Metal Arc Welding Pipe Lab A
Valid Course Code: 480536

Course Description: Students will learn the required manipulative skills to arc weld pipe using mild steel electrodes in the 2G and 5G positions including proper pipe preparations, electrodes, safety precautions, and welding sequences. Fillet welds on pipe joints are also included in 2F, 2FR, 4F, and 5F positions.

Prerequisite: SMAW Open Groove Lab - 480535

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on integrity, responsibility, quality, discipline and teamwork.
4. Use lab equipment and tools.
5. Apply principles of SMAW.

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 227
- CTSO - SkillsUSA

Shielded Metal Arc Welding Pipe Lab B
Valid Course Code: 480537

Course Description: Students will learn the required manipulative skills to arc weld pipe using mild steel electrodes in the 6G position including proper pipe preparations, electrodes, safety precautions, and welding sequences.

Prerequisites: SMAW Open Groove Lab - 480535

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on integrity, responsibility, quality, discipline and teamwork.
4. Weld pipe (SMAW).

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 229
- CTSO - SkillsUSA

Shielded Metal Arc Welding (SMAW)
Valid Course Code: 480521

Course Description: Students learn the identification, inspection, and maintenance of SMAW electrodes; principles of SMAW; the effects of variables on the SMAW process to weld plate and pipe; and metallurgy.

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with integrity, responsibility, quality, discipline and teamwork.
4. Identify, select, and store SMAW electrodes.
5. Apply principles of SMAW process to cut and weld metals.
6. Apply the knowledge of the effects of variables on the SMAW process to weld plate and pipe.
7. Apply the knowledge of basic metallurgy to control chemical, physical, and mechanical properties of carbon steel.
8. Use shop equipment and tools.

Content/Process – Additional Content (optional)
(Must be taught for students in Skilled Trades Welding Track – CIP 48.0508.99)

1. Interpret and apply tolerances
2. Interpret and apply American Welding Society welding symbols
3. Draw shop sketches
4. Read and interpret blueprints
5. Interpret lines.
6. Interpret views to include AWS (ISO symbols optional).
7. Interpret conventional and datum line dimensions.
8. Interpret and apply tolerances.
9. Interpret sectioning and section lines.
10. Apply principles of oxy-fuel systems to cut, weld, braze, and braze-weld with oxy-fuel.
11. Apply principles of controlling distortion.
12. Setup components of oxy-fuel equipment and setup procedures.
13. Apply oxy-fuel cutting applications and procedures.
14. Apply oxy-fuel welding applications and procedures.
15. Apply brazing and braze welding principles and applications.

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 120
- CTSO - SkillsUSA

SMAW Groove Welds with Backing Lab
Valid Course Code: 480528

Course Description: Students will acquire the manipulative skills to do groove welds in all positions with backing.

Prerequisites: Shielded Metal Arc Welding (SMAW) - 480521 or Consent of Instructor

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on Integrity, responsibility, quality, discipline and teamwork.
4. Weld SMAW groove welds in all positions.

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 123
- CTSO - SkillsUSA

SMAW Open Groove Lab
Valid Course Code: 480535

Course Description: This course oOffers the student the opportunity to advance skills in the practical aspects of vee-butt plate welding using SMAW.

Prerequisites: Shielded Metal Arc Welding (SMAW)-480521 or Consent of Instructor

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on Integrity, responsibility, quality, discipline and teamwork.
4. Apply principles of SMAW to welding.
5. Perform skills in vee-butt plate welding.

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 225
- CTSO - SkillsUSA

Special Problems (Welding)
Valid Course Code: 480595

Course Description: This is a course designed for the student who has demonstrated specific needs.

Prerequisites: Permission of Instructor

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on Integrity, responsibility, quality, discipline and teamwork.
4. Complete selected tasks/problems as determined by the instructor.

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 198
- CTSO - SkillsUSA

Welding Certification
Valid Course Code: 480507

Course Description: Students will gain a working knowledge of certification encountered in welding. The student will start with developing a WPS, qualify the WPS, and qualify personnel. Documents used in welding certification are developed and used.

Content/Process

Students will:

1. Practice and perform safe shop procedures at all times.
2. Apply the technical math required for employment opportunities in welding.
3. Perform all duties with emphasis on Integrity, responsibility, quality, discipline and teamwork.
4. Apply destructive and non-destructive testing methods.
5. Apply knowledge of procedure qualification.
6. Apply knowledge of performance qualification.
7. Apply knowledge of welding codes.
8. Apply knowledge of welding standards.
9. Apply knowledge of welding specifications.

Connections

- State Standards
- KOSSA
- State Technical Standards
- New Generation Science Standards
- American Welding Society (AWS) Industry Standards
- KCTCS Course: WLD 220
- CTSO - SkillsUSA