



Fox Valley Technical College

10621123 GMAW Techniques 1

Course Design

Course Information

Alternate Title N/A

Description Demonstrates welding on steel sheet metals and plates. Emphasis is placed on axial spray, pulse spray and short circuit mode of transfer. Upon completion of this course, the student will be able to weld in all positions, read basic weld symbols, and have an understanding of written welding procedures.

Total Credits 2.00

Total Hours 72.00

Types of Instruction

Instruction Type	Credits/Hours
On Campus Lab	72.00 Hours

Purpose/Goals

Identify terminology, equipment, shielding gas and consumable requirements, limitations and quality standards. Perform fillet and groove welds on plain carbon steel in all positions with the short circuit and pulse spray mode of transfer; fillet and groove welds in the flat and horizontal positions with the spray transfer mode; and performance weld test to evaluate welders abilities.

Target Population

Post-secondary adult education

Pre/Corequisites

Corequisite Welding & Metal Fab Intro & Safety (10621105)

Textbooks

Welding Safety. Miller Electric. Publication.

Gas Metal Arc Welding. Miller Electric. Publication.

Learner Supplies

Welding Helmet & Lens. **Manufacturer:** Welding Suppliers. **Quantity:** 1 Each. **Description:** Lens may be anything from single shade to auto-darkening adjustable shade. Helmet to match lens. Required.

Safety Glasses. **Manufacturer:** Any Approved Supplier. **Quantity:** 1. **Description:** Approved safety glasses with side shields are a must. If you have prescription glasses they must be safety glasses, not just plastic. Required.

Head Protection (Skull Cap). **Manufacturer:** Welding Suppliers or Others. Required.

Gauntlet Gloves. **Manufacturer:** Welding Suppliers or Others. **Quantity:** 1 Pair. **Description:** One pair of heavy leather welding gloves. Required.

Welding Leathers or Flame Retardant Coat. **Manufacturer:** Welding Suppliers. **Quantity:** 1. **Description:** Welding suppliers will handle both kinds listed. Required.

Work Shoes. **Manufacturer:** Shoe Stores. **Quantity:** 1 Pair. **Description:** Work shoes need to be leather. Athletic shoes are not allowed. Work shoes do not have to be safety toe, however, they are recommended. Required.

Welpers or Needle Nose Pliers w/ Side-Cutters. **Manufacturer:** Welding Suppliers or Others. **Quantity:** 1. **Description:** Welpers are designed specifically for welding and are highly recommended. Required.

Employability Essentials

1. Act Responsibly - Apply ethical standards in both personal and professional behavior.
2. Adapt to Change - Anticipate changes and positively respond to them.
3. Communicate Effectively and Respectfully - Apply appropriate writing, speaking, and listening skills across various settings to engage diverse audiences.
4. Think Critically and Creatively - Apply independent and rigorous reasoning that leads to informed decisions, innovation and personal empowerment.
5. Work Collaboratively - Work collaboratively with others to complete tasks, solve problems, resolve conflicts, provide information, and offer support.

Course Competencies

1. Explain course expectations.

Assessment Strategies

- 1.1. Discussion Participation

Criteria

Your performance will be successful when:

- 1.1. you identify course information.
- 1.2. you identify instructor information.
- 1.3. you identify course description.
- 1.4. you identify prerequisites and corequisites.
- 1.5. you identify textbook requirements.
- 1.6. you explain required course supplies.
- 1.7. you express college employability essentials.
- 1.8. you recognize course competencies.
- 1.9. you identify course timeline.
- 1.10. you explain course grading procedures.
- 1.11. you detail attendance policy.
- 1.12. you describe academic integrity.
- 1.13. you utilize guidelines for success.
- 1.14. you recognize safety policies.
- 1.15. you identify cleanup policies.
- 1.16. you describe final clean up expectations.
- 1.17. you identify cell phone policy.
- 1.18. you describe location of important school documentation.
- 1.19. you express school-wide policies and expectations.

Learning Objectives

- 1.a. Reference course requirements.

2. Apply GMAW safety procedures.

Assessment Strategies

- 2.1. Discussion Participation
- 2.2. Participation in laboratory activity
- 2.3. Completion of Section 1 worksheet
- 2.4. Demonstration of safe practices.
- 2.5. Completion of Section 1 safety test

Criteria

Your performance will be successful when:

- 2.1. you describe OSHA's roll in manufacturing safety.
- 2.2. you identify American national standards institute ANSI.
- 2.3. you describe ANSI Z49.1.
- 2.4. you describe ANSI Z87.1.
- 2.5. you identify the National Electrical Code (NEC).
- 2.6. you identify the Compressed Gas Association (CGA).
- 2.7. you identify the proper storage of shielding gas cylinders.
- 2.8. you identify the proper methods of securing cylinders for transport.
- 2.9. you describe the steps involved with placing a cylinder into use.
- 2.10. you identify the ultimate failure of a compressed gas cylinder and its possible causes for failure.
- 2.11. you identify the dangers associated with compressed gas cylinders.
- 2.12. you identify the path of least resistance.
- 2.13. you explain a basic electrical welding circuit.
- 2.14. you demonstrate the use of proper electrical terminology.
- 2.15. you identify factors that affect electrical safety considerations.
- 2.16. you determine when electrical circuits are live or "hot".
- 2.17. you demonstrate the proper use of safety glasses and face shields.
- 2.18. you identify a confined space.
- 2.19. you demonstrate the use of the correct gloves for the task.
- 2.20. you identify the correct filter glass shade for the application.
- 2.21. you demonstrate the use of proper clothing for the application.
- 2.22. you demonstrate the use of proper footwear for the application.
- 2.23. you identify Toxic gases associated with GMAW.
- 2.24. you identify the dangers associated with arc radiation to the eyes and skin and PPE.
- 2.25. you identify fume extraction methods.
- 2.26. you identify non-toxic gas hazards associated with GMAW.
- 2.27. you identify common environmental hazards associated with GMAW.
- 2.28. you identify whom is responsible for the safety of others.
- 2.29. you identify commonly overlooked sources of danger in the welding environment.
- 2.30. you demonstrate situational awareness when in a welding environment.
- 2.31. you demonstrate safe practices involved with welding or cutting on containers.

Learning Objectives

- 2.a. Identify safe practice standards and associations.
- 2.b. Investigate Compressed gas Cylinder safety.
- 2.c. Explain Electrical safety.
- 2.d. Demonstrate the use of Personal Protective Equipment (PPE).
- 2.e. Identify Environmental safety concerns.
- 2.f. Express safety responsibilities of welding personnel.

3. Explore the Fundamentals of GMAW.

Assessment Strategies

- 3.1. Discussion Participation
- 3.2. Participation in laboratory activity
- 3.3. Completion of Section 2 worksheet
- 3.4. Completion of Section 2 test
- 3.5. Completion of laboratory welds

Criteria

Your performance will be successful when:

- 3.1. you differentiate between fillet and groove welds.
- 3.2. you identify the parts of a fillet weld.
- 3.3. you identify the parts of a groove weld.
- 3.4. you locate the legs of a fillet weld.
- 3.5. you identify the three throats of a fillet weld.
- 3.6. you identify the throat of a groove weld.
- 3.7. you identify the root face of a groove weld.
- 3.8. you identify the face of fillet and groove weld.
- 3.9. you identify the depth of fusion in fillet and groove welds.
- 3.10. you identify root openings in fillet and groove welds.
- 3.11. you identify the toe locations of fillet and groove welds.
- 3.12. you identify the included angle of a groove weld.
- 3.13. you identify the bevel angle of a groove weld.
- 3.14. you identify the heat affected zone in fillet and groove welds.
- 3.15. you identify the numbering system for position designation.
- 3.16. you identify the number associated with the flat position.
- 3.17. you identify the number associated with the horizontal position.
- 3.18. you identify the number associated with the vertical position.
- 3.19. you identify the number associated with the overhead position.
- 3.20. you differentiate between the flat and horizontal position.
- 3.21. you identify the axis of a weld.
- 3.22. you identify designation number and letter combinations.
- 3.23. you differentiate between the 4 major modes of transfer.
- 3.24. you demonstrate spray transfer.
- 3.25. you demonstrate short circuit transfer.
- 3.26. you demonstrate globular transfer.
- 3.27. you demonstrate pulsed spray transfer.
- 3.28. you identify derivations of short circuit transfer.
- 3.29. you identify derivations of pulsed spray transfer.
- 3.30. you identify buried arc.
- 3.31. you discuss the differences between GMAW, SMAW, GMAW-S, GMAW-P, GMAW, FCAW.
- 3.32. you identify the advantages of GMAW-S when compared to GMAW-P, GMAW, SMAW and GTAW.
- 3.33. you identify the disadvantages of GMAW-S when compared to GMAW-P, GMAW, SMAW and GTAW.
- 3.34. you identify the advantages of GMAW-P when compared to GMAW-S, GMAW, GTAW, and SMAW.
- 3.35. you identify the disadvantages of GMAW-P when compared to GMAW-S, GMAW, GTAW, and SMAW.
- 3.36. you explain how amperage affects heat input.
- 3.37. you explain how travel speed affects heat input.
- 3.38. you explain how voltage affects heat input.
- 3.39. you identify how to roughly calculate heat input.
- 3.40. you determine the minimum requirements to achieve spray transfer.
- 3.41. you identify how shielding gas affects the fluidity of the weld puddle.
- 3.42. you identify the effects of surface tension.
- 3.43. you explain transition current.
- 3.44. you demonstrate the correct polarity for GMAW.
- 3.45. you describe the relationship of electrode feed speed and amperage.
- 3.46. you differentiate straight polarity, reverse polarity, electrode positive, electrode negative and AC.
- 3.47. you identify the relationship of voltage to arc length.
- 3.48. you describe the effects of travel speed changes on the weld.
- 3.49. you describe the effects of voltage changes on the weld.
- 3.50. you describe the effects of electrode feed speed on the weld.
- 3.51. you recognize a good sounding short circuit transfer mode.
- 3.52. you identify the easiest position for welding.
- 3.53. you demonstrate being comfortable before welding.
- 3.54. you identify the effect of gravity on GMAW welds.
- 3.55. you demonstrate recommended work angles when welding.
- 3.56. you demonstrate recommended travel angles when welding.
- 3.57. you differentiate between work angle and travel angle.
- 3.58. you demonstrate proper Interpass cleaning of multiple pass welds.

Learning Objectives

- 3.a. Identify the types and parts of welds.
- 3.b. Explain the position designation system.
- 3.c. Demonstrate the modes of transfer.
- 3.d. Describe the advantages and disadvantages of GMAW and its modes of transfer.
- 3.e. Describe the major process variables.
- 3.f. Identify the angles and techniques necessary for creating acceptable welds.

4. Operate GMAW equipment.

Assessment Strategies

- 4.1. Discussion Participation
- 4.2. Participation in laboratory activity
- 4.3. Completion of Section 3 worksheet
- 4.4. Completion of Section 3 test
- 4.5. Completion of laboratory welds according to a shop drawing provided

Criteria

Your performance will be successful when:

- 4.1. you identify the parts of a GMAW gun.
- 4.2. you demonstrate the proper set-up of a GMAW gun.
- 4.3. you demonstrate changing a gun liner.
- 4.4. you demonstrate how to change gun consumables such as contact tips, nozzles and gas diffusers.
- 4.5. you identify the parts of a wire feeder.
- 4.6. you differentiate between drive roll types.
- 4.7. you select the correct drive roll size.
- 4.8. you identify the spool brake.
- 4.9. you identify the drive roll pressure adjustment.
- 4.10. you identify the wire feeder controls.
- 4.11. you set-up a wire feeder correctly with the electrode pay off unrestricted.
- 4.12. you recover from "birds nesting".
- 4.13. you identify the cause of "birds nesting".
- 4.14. you connect the gun to the wire feeder.
- 4.15. you connect a wire feeder to a GMAW power supply.
- 4.16. you differentiate between different types of power supplies.
- 4.17. you identify power supply controls.
- 4.18. you identify available power supply features.

Learning Objectives

- 4.a. Explore GMAW guns.
- 4.b. Explore wire feeder.
- 4.c. Explore GMAW power supplies.

5. Manage Shielding gases, consumables, and applications.

Assessment Strategies

- 5.1. Discussion Participation
- 5.2. Participation in laboratory activity
- 5.3. Completion of Section 4 worksheet
- 5.4. Completion of Section 4 test
- 5.5. Completion of laboratory welds

Criteria

Your performance will be successful when:

- 5.1. you differentiate between inert and reactive gases.
- 5.2. you identify the purpose of shielding gases.
- 5.3. you identify shielding gas mixtures commonly used in GMAW and GMAW-S.
- 5.4. you differentiate MIG and GMAW.
- 5.5. you identify the effects of a shielding gas change.
- 5.6. you summarize the importance of Charpy impact values.
- 5.7. you identify the importance of deoxidizers being added to electrodes.
- 5.8. you determine the AWS specification of steel electrodes.

- 5.9. you explain the AWS electrode classification system.
- 5.10. you identify commonly used electrode classifications.
- 5.11. you determine the multiple purposes of an electrode.
- 5.12. you refer to manufacturers of electrodes for proper use.
- 5.13. you determine reasonable electrode feed speeds for semi-automatic operation.
- 5.14. you identify common deoxidizers used in GMAW electrodes.
- 5.15. you differentiate between cylinders, bulk, micro bulk, and packaged cylinder storage systems.
- 5.16. you identify point of use deliver systems.
- 5.17. you identify manifold delivery systems.
- 5.18. you identify mixing systems.
- 5.19. you identify a regulator.
- 5.20. you identify a flowmeter.
- 5.21. you differentiate between regulators and flowmeters.
- 5.22. you identify safety precautions when using compressed gas cylinders.
- 5.23. you demonstrate the safe "cracking" of a valve.
- 5.24. you attach a source of shielding gas to a welding system.
- 5.25. you express shielding gas percentages correctly.
- 5.26. you identify the potential pitfalls of dry ice formation on cylinders valves.

Learning Objectives

- 5.a. Explore shielding gases.
- 5.b. Explore Electrodes.
- 5.c. Identify gas delivery systems and components.

6. Investigate inspection and quality control.

Assessment Strategies

- 6.1. Discussion Participation
- 6.2. Participation in laboratory activity
- 6.3. Completion of Section 5 worksheet
- 6.4. Completion of Section 5 test
- 6.5. Completion of laboratory welds
- 6.6. Completion of weld tests

Criteria

Your performance will be successful when:

- 6.1. you identify visual acceptance criterion.
- 6.2. you differentiate between destructive and non-destructive testing.
- 6.3. you identify welding codes.
- 6.4. you identify welding procedure specifications (WPS).
- 6.5. you identify porosity.
- 6.6. you identify overlap/cold lap.
- 6.7. you identify incomplete fusion.
- 6.8. you identify incomplete joint penetration.
- 6.9. you identify "whiskers".
- 6.10. you identify inclusions.
- 6.11. you identify undercut.
- 6.12. you resolve process parameters to eliminate discontinuities.
- 6.13. you identify weld metal cracks.
- 6.14. you identify heat affected zone cracks.
- 6.15. you identify "wagon tracks".
- 6.16. you identify discontinuities that meet the criteria for becoming a defect.
- 6.17. you apply visual acceptance criterion.
- 6.18. you apply bend test acceptance criterion.
- 6.19. you resolve process parameters to eliminate discontinuities.

Learning Objectives

- 6.a. Explore inspection.
- 6.b. Explore discontinuities.
- 6.c. Explore defects.

Grant Award

This workforce product was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. The product was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The U.S. Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including, but not limited to, accuracy of information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership.

Auxiliary aids and services are available upon request to individuals with disabilities.

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Course Learning Plans and Performance Assessment Tasks

Course Expectations

Target Competencies

1. Explain course expectations.

Assessment Strategies

- 1.1. Discussion Participation

Criteria

Your performance will be successful when:

- 1.1. you identify course information.
- 1.2. you identify instructor information.
- 1.3. you identify course description.
- 1.4. you identify prerequisites and corequisites.
- 1.5. you identify textbook requirements.
- 1.6. you explain required course supplies.
- 1.7. you express college employability essentials.
- 1.8. you recognize course competencies.
- 1.9. you identify course timeline.
- 1.10. you explain course grading procedures.
- 1.11. you detail attendance policy.
- 1.12. you describe academic integrity.
- 1.13. you utilize guidelines for success.
- 1.14. you recognize safety policies.
- 1.15. you identify cleanup policies.
- 1.16. you describe final clean up expectations.
- 1.17. you identify cell phone policy.
- 1.18. you describe location of important school documentation.
- 1.19. you express school-wide policies and expectations.

Learning Objectives

- 1.a. Reference course requirements.

Learning Activities

1. Read course syllabus documentation.
2. Participate in course requirements classroom discussion.

GMAW Safety Procedures

Target Competencies

1. Apply GMAW safety procedures.

Assessment Strategies

- 1.1. Discussion Participation
- 1.2. Participation in laboratory activity
- 1.3. Completion of Section 1 worksheet
- 1.4. Demonstration of safe practices.
- 1.5. Completion of Section 1 safety test

Criteria

Your performance will be successful when:

- 1.1. you describe OSHA's roll in manufacturing safety.
- 1.2. you identify American national standards institute ANSI.
- 1.3. you describe ANSI Z49.1.
- 1.4. you describe ANSI Z87.1.
- 1.5. you identify the National Electrical Code (NEC).
- 1.6. you identify the Compressed Gas Association (CGA).
- 1.7. you identify the proper storage of shielding gas cylinders.
- 1.8. you identify the proper methods of securing cylinders for transport.
- 1.9. you describe the steps involved with placing a cylinder into use.
- 1.10. you identify the ultimate failure of a compressed gas cylinder and its possible causes for failure.
- 1.11. you identify the dangers associated with compressed gas cylinders.
- 1.12. you identify the path of least resistance.
- 1.13. you explain a basic electrical welding circuit.
- 1.14. you demonstrate the use of proper electrical terminology.
- 1.15. you identify factors that affect electrical safety considerations.
- 1.16. you determine when electrical circuits are live or "hot".
- 1.17. you demonstrate the proper use of safety glasses and face shields.
- 1.18. you identify a confined space.
- 1.19. you demonstrate the use of the correct gloves for the task.
- 1.20. you identify the correct filter glass shade for the application.
- 1.21. you demonstrate the use of proper clothing for the application.
- 1.22. you demonstrate the use of proper footwear for the application.
- 1.23. you identify Toxic gases associated with GMAW.
- 1.24. you identify the dangers associated with arc radiation to the eyes and skin and PPE.
- 1.25. you identify fume extraction methods.
- 1.26. you identify non-toxic gas hazards associated with GMAW.
- 1.27. you identify common environmental hazards associated with GMAW.
- 1.28. you identify whom is responsible for the safety of others.
- 1.29. you identify commonly overlooked sources of danger in the welding environment.
- 1.30. you demonstrate situational awareness when in a welding environment.
- 1.31. you demonstrate safe practices involved with welding or cutting on containers.

Learning Objectives

- 1.a. Identify safe practice standards and associations.
- 1.b. Investigate Compressed gas Cylinder safety.
- 1.c. Explain Electrical safety.
- 1.d. Demonstrate the use of Personal Protective Equipment (PPE).
- 1.e. Identify Environmental safety concerns.
- 1.f. Express safety responsibilities of welding personnel.

Learning Activities

- 1. Read about safe practices standards and associations.
- 2. Perform assigned worksheet homework for Section 1 GMAW Safety.
- 3. Review classroom homework on Section 1 GMAW Safety.
- 4. Associate laboratory GMAW safety demonstrations with homework assignments.
- 5. Read about compressed gas cylinder safety.
- 6. Perform assigned worksheet homework for Section 1 GMAW Safety.
- 7. Review classroom homework on Section 1 GMAW Safety.
- 8. Associate laboratory GMAW safety demonstrations with homework assignments.
- 9. Read about electrical safety.
- 10. Perform assigned worksheet homework for Section 1 GMAW Safety.
- 11. Review classroom homework on Section 1 GMAW Safety.
- 12. Associate laboratory GMAW safety demonstrations with homework assignments.
- 13. Read about Personal Protective Equipment (PPE).
- 14. Perform assigned worksheet homework for Section 1 GMAW Safety.
- 15. Review classroom homework on Section 1 GMAW Safety.
- 16. Associate laboratory GMAW safety demonstrations with homework assignments.
- 17. Read about environmental safety concerns related to GMAW.
- 18. Perform assigned worksheet homework for Section 1 GMAW Safety.
- 19. Review classroom homework on Section 1 GMAW Safety.
- 20. Associate laboratory GMAW safety demonstrations with homework assignments.
- 21. Read about the responsibilities of welding personnel.
- 22. Perform assigned worksheet homework for Section 1.
- 23. Review classroom homework on Section 1.
- 24. Associate laboratory demonstrations with homework assignments.

Exploring the Fundamentals of GMAW

Target Competencies

1. Explore the Fundamentals of GMAW.

Assessment Strategies

- 1.1. Discussion Participation
- 1.2. Participation in laboratory activity
- 1.3. Completion of Section 2 worksheet
- 1.4. Completion of Section 2 test
- 1.5. Completion of laboratory welds

Criteria

Your performance will be successful when:

- 1.1. you differentiate between fillet and groove welds.
- 1.2. you identify the parts of a fillet weld.
- 1.3. you identify the parts of a groove weld.
- 1.4. you locate the legs of a fillet weld.
- 1.5. you identify the three throats of a fillet weld.
- 1.6. you identify the throat of a groove weld.
- 1.7. you identify the root face of a groove weld.
- 1.8. you identify the face of fillet and groove weld.
- 1.9. you identify the depth of fusion in fillet and groove welds.
- 1.10. you identify root openings in fillet and groove welds.
- 1.11. you identify the toe locations of fillet and groove welds.
- 1.12. you identify the included angle of a groove weld.
- 1.13. you identify the bevel angle of a groove weld.
- 1.14. you identify the heat affected zone in fillet and groove welds.
- 1.15. you identify the numbering system for position designation.
- 1.16. you identify the number associated with the flat position.
- 1.17. you identify the number associated with the horizontal position.
- 1.18. you identify the number associated with the vertical position.
- 1.19. you identify the number associated with the overhead position.
- 1.20. you differentiate between the flat and horizontal position.
- 1.21. you identify the axis of a weld.
- 1.22. you identify designation number and letter combinations.
- 1.23. you differentiate between the 4 major modes of transfer.
- 1.24. you demonstrate spray transfer.
- 1.25. you demonstrate short circuit transfer.
- 1.26. you demonstrate globular transfer.
- 1.27. you demonstrate pulsed spray transfer.
- 1.28. you identify derivations of short circuit transfer.
- 1.29. you identify derivations of pulsed spray transfer.
- 1.30. you identify buried arc.
- 1.31. you discuss the differences between GMAW, SMAW, GMAW-S, GMAW-P, GMAW, FCAW.
- 1.32. you identify the advantages of GMAW-S when compared to GMAW-P, GMAW, SMAW and GTAW.
- 1.33. you identify the disadvantages of GMAW-S when compared to GMAW-P, GMAW, SMAW and GTAW.
- 1.34. you identify the advantages of GMAW-P when compared to GMAW-S, GMAW, GTAW, and SMAW.
- 1.35. you identify the disadvantages of GMAW-P when compared to GMAW-S, GMAW, GTAW, and SMAW.
- 1.36. you explain how amperage affects heat input.
- 1.37. you explain how travel speed affects heat input.
- 1.38. you explain how voltage affects heat input.
- 1.39. you identify how to roughly calculate heat input.
- 1.40. you determine the minimum requirements to achieve spray transfer.
- 1.41. you identify how shielding gas affects the fluidity of the weld puddle.
- 1.42. you identify the effects of surface tension.
- 1.43. you explain transition current.
- 1.44. you demonstrate the correct polarity for GMAW.
- 1.45. you describe the relationship of electrode feed speed and amperage.

- 1.46. you differentiate straight polarity, reverse polarity, electrode positive, electrode negative and AC.
- 1.47. you identify the relationship of voltage to arc length.
- 1.48. you describe the effects of travel speed changes on the weld.
- 1.49. you describe the effects of voltage changes on the weld.
- 1.50. you describe the effects of electrode feed speed on the weld.
- 1.51. you recognize a good sounding short circuit transfer mode.
- 1.52. you identify the easiest position for welding.
- 1.53. you demonstrate being comfortable before welding.
- 1.54. you identify the effect of gravity on GMAW welds.
- 1.55. you demonstrate recommended work angles when welding.
- 1.56. you demonstrate recommended travel angles when welding.
- 1.57. you differentiate between work angle and travel angle.
- 1.58. you demonstrate proper Interpass cleaning of multiple pass welds.

Learning Objectives

- 1.a. Identify the types and parts of welds.
- 1.b. Explain the position designation system.
- 1.c. Demonstrate the modes of transfer.
- 1.d. Describe the advantages and disadvantages of GMAW and its modes of transfer.
- 1.e. Describe the major process variables.
- 1.f. Identify the angles and techniques necessary for creating acceptable welds.

Learning Activities

- 1. Read about the types and parts of welds.
- 2. Perform assigned worksheet homework for Section 2.
- 3. Review classroom homework on Section 2.
- 4. Associate laboratory demonstrations with homework assignments.

Operating GMAW Equipment

Target Competencies

- 1. Operate GMAW equipment.

Assessment Strategies

- 1.1. Discussion Participation
- 1.2. Participation in laboratory activity
- 1.3. Completion of Section 3 worksheet
- 1.4. Completion of Section 3 test
- 1.5. Completion of laboratory welds according to a shop drawing provided

Criteria

Your performance will be successful when:

- 1.1. you identify the parts of a GMAW gun.
- 1.2. you demonstrate the proper set-up of a GMAW gun.
- 1.3. you demonstrate changing a gun liner.
- 1.4. you demonstrate how to change gun consumables such as contact tips, nozzles and gas diffusers.
- 1.5. you identify the parts of a wire feeder.
- 1.6. you differentiate between drive roll types.
- 1.7. you select the correct drive roll size.
- 1.8. you identify the spool brake.
- 1.9. you identify the drive roll pressure adjustment.
- 1.10. you identify the wire feeder controls.
- 1.11. you set-up a wire feeder correctly with the electrode pay off unrestricted.
- 1.12. you recover from "birds nesting".
- 1.13. you identify the cause of "birds nesting".

- 1.14. you connect the gun to the wire feeder.
- 1.15. you connect a wire feeder to a GMAW power supply.
- 1.16. you differentiate between different types of power supplies.
- 1.17. you identify power supply controls.
- 1.18. you identify available power supply features.

Learning Objectives

- 1.a. Explore GMAW guns.
- 1.b. Explore wire feeder.
- 1.c. Explore GMAW power supplies.

Learning Activities

- 1. Read about GMAW guns.
- 2. Perform assigned worksheet homework for Section 3.
- 3. Review classroom homework on Section 3.
- 4. Associate laboratory demonstrations with homework assignments.

Managing Shielding Gases, Consumables, and Applications

Target Competencies

- 1. Manage Shielding gases, consumables, and applications.

Assessment Strategies

- 1.1. Discussion Participation
- 1.2. Participation in laboratory activity
- 1.3. Completion of Section 4 worksheet
- 1.4. Completion of Section 4 test
- 1.5. Completion of laboratory welds

Criteria

Your performance will be successful when:

- 1.1. you differentiate between inert and reactive gases.
- 1.2. you identify the purpose of shielding gases.
- 1.3. you identify shielding gas mixtures commonly used in GMAW and GMAW-S.
- 1.4. you differentiate MIG and GMAW.
- 1.5. you identify the effects of a shielding gas change.
- 1.6. you summarize the importance of Charpy impact values.
- 1.7. you identify the importance of deoxidizers being added to electrodes.
- 1.8. you determine the AWS specification of steel electrodes.
- 1.9. you explain the AWS electrode classification system.
- 1.10. you identify commonly used electrode classifications.
- 1.11. you determine the multiple purposes of an electrode.
- 1.12. you refer to manufacturers of electrodes for proper use.
- 1.13. you determine reasonable electrode feed speeds for semi-automatic operation.
- 1.14. you identify common deoxidizers used in GMAW electrodes.
- 1.15. you differentiate between cylinders, bulk, micro bulk, and packaged cylinder storage systems.
- 1.16. you identify point of use deliver systems.
- 1.17. you identify manifold delivery systems.
- 1.18. you identify mixing systems.
- 1.19. you identify a regulator.
- 1.20. you identify a flowmeter.
- 1.21. you differentiate between regulators and flowmeters.
- 1.22. you identify safety precautions when using compressed gas cylinders.
- 1.23. you demonstrate the safe "cracking" of a valve.
- 1.24. you attach a source of shielding gas to a welding system.

- 1.25. you express shielding gas percentages correctly.
- 1.26. you identify the potential pitfalls of dry ice formation on cylinders valves.

Learning Objectives

- 1.a. Explore shielding gases.
- 1.b. Explore Electrodes.
- 1.c. Identify gas delivery systems and components.

Learning Activities

1. Read about shielding gases.
2. Perform assigned worksheet homework for Section 4.
3. Review classroom homework on Section 4.
4. Associate laboratory demonstrations with homework assignments.

Investigating Inspection and Quality Control

Target Competencies

1. Investigate inspection and quality control.

Assessment Strategies

- 1.1. Discussion Participation
- 1.2. Participation in laboratory activity
- 1.3. Completion of Section 5 worksheet
- 1.4. Completion of Section 5 test
- 1.5. Completion of laboratory welds
- 1.6. Completion of weld tests

Criteria

Your performance will be successful when:

- 1.1. you identify visual acceptance criterion.
- 1.2. you differentiate between destructive and non-destructive testing.
- 1.3. you identify welding codes.
- 1.4. you identify welding procedure specifications (WPS).
- 1.5. you identify porosity.
- 1.6. you identify overlap/cold lap.
- 1.7. you identify incomplete fusion.
- 1.8. you identify incomplete joint penetration.
- 1.9. you identify "whiskers".
- 1.10. you identify inclusions.
- 1.11. you identify undercut.
- 1.12. you resolve process parameters to eliminate discontinuities.
- 1.13. you identify weld metal cracks.
- 1.14. you identify heat affected zone cracks.
- 1.15. you identify "wagon tracks".
- 1.16. you identify discontinuities that meet the criteria for becoming a defect.
- 1.17. you apply visual acceptance criterion.
- 1.18. you apply bend test acceptance criterion.
- 1.19. you resolve process parameters to eliminate discontinuities.

Learning Objectives

- 1.a. Explore inspection.
- 1.b. Explore discontinuities.
- 1.c. Explore defects.

Learning Activities

1. Read about inspection.
2. Perform assigned worksheet homework for Section 5.
3. Review classroom homework on Section 5.
4. Associate laboratory demonstrations with homework assignments.

10-621-123 GMAW Techniques 1

Course Outline

Week 1

Lecture

- Introduction
- Section 1: Fundamentals

Lab Work

- Introduce Power source and Wire feeder.
- Demonstrate proper set up of the welding system.

Weld Lab

- Lab 1
 - Reminder to have your instructor initial or sign your lab paperwork so you have a record showing you have completed a lab or individual weldment.

Homework assignment(s)

- Complete Section 1 worksheet

Week 2

Lecture- Section 1: Fundamentals of GMAW continued

Weld Lab

- Lab 1
 - Reminder to have your instructor initial or sign your lab paperwork so you have a record showing you have completed a lab or individual weldment.

Homework assignment(s)

- Complete Section 2 worksheet
- Prepare for Section 1 test

Week 3

Test – Section 1: Fundamentals

Lecture – Section 2: GMAW Equipment

Weld Lab

- Lab 2

Homework assignment(s)

- Complete Section 3 worksheet
- Prepare for Section 2 test

Week 4

Test – Section 2: Equipment

Lecture- Section 3: Shielding Gases, consumables and applications

Weld Lab

- Lab 2

Homework assignment(s)

- Complete Section 4 worksheet
- Prepare for Section 3 test

Week 5 and 6

Test – Section 3: Shielding Gases, consumables and applications

Lecture- Section 4: Inspection and quality control

Weld Lab

- Lab 3

Homework assignment(s)

- Prepare for Section 4 test.

Week 7

Test – Section 4: Inspection and quality control

Weld Lab

- Lab 4

Week 8 - 13

Weld Lab

- Lab 5, Lab 6, Lab 7, Lab 8, Lab 9

Week 14 – Week 17

Weld Tests

- Test 1, Test 2, Test 3

GMAW Techniques 1

Course Syllabus

Course Information

Organization	Fox Valley Technical College
Course Number	10-621-123
Credits	2
Hours	72
Course Dates	XXXXXXXXXX
Meeting Time(s)	XXXXXXXXXX
Locations	XXXXXXXXXX
Instructional Method	In-person classroom instruction and laboratory activities with on-line supplement (Blackboard).

Instructor Information

Instructor Name	XXXXXXXXXX
Instructor E-mail	XXXXXXXXXX
Office Hours	XXXXXXXXXX
Office Phone	XXXXXXXXXX

Course Description

Demonstrates welding on steel sheet metals and plates. Emphasis is placed on spray, pulse spray, and short circuit modes of transfer. Upon completion of this course, the student will be able to weld in all positions, successfully set-up and troubleshoot process related variables, read basic weld symbols, and have an understanding of written welding procedure specifications.

Prerequisite(s)

None

Corequisite(s)

10-621-105 Welding & Metal Fab Intro and Safety

Textbook

Welding Safety. Miller Electric. Publication. Part # 247359

Gas Metal Arc Welding. Miller Electric. Publication. Part # 250834

Required Supplies

Safety Glasses	Z87+ approved with side shields (prescription safety glasses okay with clip on side shields) are required .
Welding Helmet	Can be manual or auto-darkening lens.
Clear Cover Lenses	To protect the welding lens from sparks and spatter. Buy at least 5.
Shaded Lens	If a manual helmet, additional shaded lenses of varying darkness need to be purchased. Purchase a shade 10, 11, and 12.
Work Shoes/Boots	Safety toe leather work shoes or boot are required . Tennis shoes are not allowed in the shop.
Head Protection	Welder's beanie or skullcaps to protect head from sparks.
Gloves	1pr – Gauntlet, 1pr – TIG, 1pr – Leather Work will get you started.

Weld Jacket	Should be leather or flame-resistant treated cotton. Leather will last longer and protect better but cost more initially. Treated cotton costs less but needs replacing often.
Supplies Bag	Something large enough to hold your welding supplies.
Chipping Hammer	A standalone chipping hammer without a wire brush attachment.
Wire Brushes	Qty 1 – carbon steel brush, Qty 1- stainless steel brush
Pliers	A Welper's (welder's pliers) from a welding supplier is best but a needle nose with side cutter or (wire cutter) is acceptable.
Tape Measure	10-12ft. is recommended. Look for a ¾" wide blade with 1/32" graduations. Avoid carpenter's tape measures.
Combination Square	Find one with a protractor attachment.
Scratch Awl	For marking parts in fabrication classes.
Center Punch	For marking center of radii and diameter of holes.
Flashlight	Any type or size will work.
Caliper	6" dial or digital with measurement down to 0.001"
Calculator	Ti-30Xa or equivalent
USB Flash Drive	Any size should work. Look for 2GB or bigger.
Sharpie Markers	Fine tip version for marking material.

College Core Abilities (Employability Essentials)

- Adapt to Change – Anticipate changes and positively respond to them.
- Think Critically and Creatively – Apply independent and rigorous reasoning that leads to informed decisions, innovation, and personal empowerment.
- Work Collaboratively – Work collaboratively with others to complete tasks, solve problems, resolve conflicts, provide information, and offer support.
- Communicate effectively and respectfully – Apply appropriate writing, speaking, and listening skills across various settings to engage diverse audiences.
- Act Responsibly – Apply ethical standards in both personal and professional behavior.

Course Competencies

- Explain course expectations.
- Apply GMAW safety procedures.
- Explore the Fundamentals of GMAW.
- Operate GMAW equipment.
- Manage Shielding gases, consumables, and applications.
- Investigate Inspection and Quality Control.

Course Timeline

Date(s)	Section
Week 1-2	1-Fundamentals
Week 3	2-Equipment
Week 4	3-Shielding Gases and Consumables
Week 5-6	4-Inspection and Quality Control
Week 7-13	Laboratory task completion
Week 14-17	Weld test

Grading Procedures

All reading assignments, written worksheets, lab assignments, and other class work must be completed if you expect a passing grade. Attending discussions is essential for passing written tests. Your grade is derived from the completion of worksheets, exams, laboratory projects, and classroom and on-line participation. Exam and lab scores are calculated at the end of the semester to find your course score. Grades for tests, worksheets, other assignments, as well as the course itself are based on percentages. Letter grades are assigned to those percentages based on how well you have achieved the course objectives. At the end of the term, you will receive your individual letter grades and a grade point average (GPA). Your GPA is computed by finding the point value assigned to each letter grade (i.e. A=4.00, A-=3.67, etc). Letter grades are given the following grade point values:

Percentage Range	Letter	Equivalent Work	Grade Points
100 - 96%	A	Excellent	4.00
<96 – 93%	A-		3.67
<93 – 90%	B+		3.33
<90 – 87%	B	Above Average	3.00
<87 – 84%	B-		2.67
<84 – 81%	C+		2.33
<81 – 78%	C	Average	2.00
<78 – 75%	C-		1.67
<75%	F	Failure	0.00

All coursework for this class is weighted. That means, regardless of the point value awarded for individual assignments, the entire category an assignment falls into is given more or less grade “weight” as the instructor sees fit. Category weight for this course is as follows:

Work Habits	10%
Participation	10%
Section Tests	30%
Weld Labs/Tests	50%
Total	100%

Work habits are assessed based on your professionalism during the class. A reduction to the work habits grade is at the discretion of the instructor. The severity of the infraction can warrant a reduction of 1-5 points per occurrence. It is important to realize that your work habits in this course can drastically affect your final grade. This includes but is not limited to:

- Showing up to class on time
- Attending class regularly
- Being prepared for class
- Not being disruptive during class or break times
- Using class time and time outside of class effectively
- Contributing to classroom and Blackboard discussions
- Keeping a positive attitude during class time
- Upholding personal integrity and ethical decision making
- Keeping to assignment schedules
- Admitting mistakes
- Performing tasks to the best of abilities

Each weld associated with a given lab is awarded a maximum of 1 point each. Assessment criteria for welds follows:

Weld not complete or does not meet the minimum acceptance criteria according to the applicable welding code.	Weld complete and meets all minimum acceptance criteria according to the applicable welding code.
0 points	1 point

Assessment criteria for weld test 1 follows:

Weld test not attempted.	Weld test attempted but fails all visual inspection.	Weld test passes visual inspection but fails bend testing.	Weld test passes visual inspection and 1 of 2 bend tests.	Weld test passes visual inspection and all bend tests.
0 points	6 points	10 points	13 points	16 Points

Assessment criteria for weld test 2 and 3 follows:

Weld test not attempted.	Weld test attempted but fails all visual inspection.	Weld test attempted but only passes root pass inspection.	Weld test attempted but only passes cover pass inspection.	Weld test passes visual inspection but fails bend testing.	Weld test passes visual inspection and 1 of 2 bend tests.	Weld test passes visual inspection and all bend tests.
0 points	6 points	8 points	8 points	10 points	13 points	16 Points

You are responsible for keeping track of your course progress. You can track your grade and progress by checking the Gradebook section in Blackboard. As assignments are completed and graded, your instructor will update your course grade. Nonetheless, you should have the instructor sign and date your copy of lab exercises and assignment sheets. Keep signed copies of assignments until after the course ends to ensure you have proof of completing an assignment if the instructor forgets to enter the grade.

The instructor will be the only one who checks off your progress in Blackboard Gradebook. Under no circumstances shall a student have access to the instructor's Gradebook program.

If you miss a section discussion, section review, or test review, **it is your responsibility** to make the necessary arrangements to get the missed information. You will not be excused from taking a test because you were absent the previous class period. Your grade at the conclusion of the course will be determined based upon the work you have completed. Any incomplete worksheets, labs, or missed tests **will be factored in**.

Make-up for missed tests must be complete within one (1) week following the missed test. After one (1) week, the test will be scored as a zero (0).

Assignments, labs, and homework not complete by their date due will be recorded as a zero (0).

Circumstances may present themselves which require a student to withdraw from a course. If you must withdraw from this course for any reason, it is in your best interest financially to talk with your instructor regarding the procedure to withdraw. If you do not, there is a chance you may be held liable for course fees even if you stop attending class. If you stop coming to class, that does not mean you are withdrawn, and it is likely you will receive a failing grade at the end of the semester. You are responsible for taking the necessary action to withdraw yourself from the class through a student advisor or the MyFVTC portal.

If situations arise where you need an extension for this course, you must talk with your instructor ahead of time to make accommodations. There are very few circumstances that would warrant a course extension. Your best option is to show up on time, every day, and complete coursework when it is due.

Attendance

To be early is to be on time.

You will need to perform the skills you will learn in this course on the job. You will also be expected to act as though you are on the job any time you are on a FVTC campus.

Participation in classroom and lab activities account for a portion of your grade in this course. If you are tardy or absent, you are not able to participate in classroom or lab activities. This will in turn effect your participation grade.

Classes start **sharply** at their designated time. If a class starts at 12pm, walking through the door at 12 noon and 1 second will render you tardy. We start our class discussions right away. Coming in late disrupts the classroom and causes lost class time.

If you are going to be tardy or absent, you are required to call or e-mail your instructor at least ten (10) minutes prior to class starting.

You are considered **tardy** if you arrive after the start of class.

If you are **tardy** 3 times in any one class, you may receive a failing grade for the class.

If you leave the classroom or lab before you are dismissed, you will be marked as being **tardy**.

If you are tardy for more than 10% of a class, you may receive a failing grade for the class. (72 hour = 7.2 unexcused hours per course).

If you are not present for class, you are considered **absent**.

If you are **absent** due to illness or another reason, you must contact your instructor at least ten (10) minutes before the start of class.

If you know you will be **absent** ahead of time or for an extended period of time, you must get the absence approved by your instructor.

If you are **absent** for 2 or more consecutive days, you are required to bring in a written excuse for the time you missed.

If you have unexcused **absences, tardies**, or a combination of the two totaling more than 10% of a class, you may receive a failing grade for the class. (72 hour = 7.2 unexcused hours per course).

If you are absent and do not call in (**no call/no show**), you will be docked 2 days as if you were absent. If you are **no call/no show** 2 times, you may receive a failing grade for the class.

Of course, there might be extenuating circumstances. These will be evaluated by the instructor on a one-on-one basis. It is your responsibility to inform the instructor of your individual situation.

Academic Integrity – Student Code of Conduct

When students enter college, they take upon themselves certain responsibilities and obligations, including satisfactory academic performance and social behavior consistent with the lawful purposes of the college. Student conduct, therefore, is not considered in isolation within the college community but as an integral part of the education process. All students are expected to know and abide by this code of student conduct. Any student found to have committed or to have attempted to commit misconduct is subject to disciplinary sanctions.

The Student Code of Conduct is available in the Student Handbook and through the Student Life office and details sanctions, appeal process, and procedures if a student violates this code.

Be prepared to work when you show up for class, and be sure you have all the needed equipment. If you do not have your equipment, you may be sent home and marked as **tardy** or **absent**. This includes but not limited to; writing utensils, books, safety supplies, proper work clothing, etc.

When someone is speaking, listen with respect. Do not talk when you are supposed to be listening.

Participate in discussions. You will learn more, and participation is a portion of your grade.

Always be patient with yourself and others. If you must leave the room, leave quietly.

Disruptive behavior during classroom discussions or activities will not be tolerated. Any student deemed disruptive by the instructor will be asked to leave for the duration of the period and marked absent. Ongoing disruptive behavior will result in disciplinary action.

No food will be allowed in the classroom at any time. Only drinks with a **sealable cap** are allowed in the classroom and shop. No fast food cups or coffee mugs are allowed if the lid can easily come off. If you spill your drink, it is your responsibility to clean it up.

Cheating, lying, or stealing will be grounds for immediate failure from the course and dismissal from the program.

This includes:

- Welding, chipping, brushing, and grinding in a position other than the assigned welding position
- Turning in work completed by another student
- Copying another student's test, exam, or assignment
- Copying files from another student and turning them in as one's own work

Work only on the projects for the course. Extra projects may be allowed from time to time, but only with the approval of your instructor. Do not assume you can make trailers, tree stands, car parts, etc.

You are expected to keep your lab/theory manual in an organized manner at all times, because if it is neat and in order you can find information faster. Inability to participate in classroom or lab discussions because of disorganization will result in a reduced participation grade for each occurrence.

Loud or rude language in the hallways will be grounds for dismissal from the day's activities and will affect your participation grade. There are other classes and offices being used while you attend school, so it is important to be courteous to others.

FVTC campuses and grounds are non-tobacco facilities. Per FVTC policy, smoking or chew will only be allowed **inside** your vehicle. Butts are to be disposed of in your vehicle, not on the ground outside the building or parking lot.

Garbage shall also be disposed of properly. Do not throw trash on the ground outside the building. Clean up your mess in the classroom. If you leave behind trash, you will be docked participation points.

Guidelines for Success

Accommodations for Persons with Disabilities - Reasonable accommodations for persons with disabilities will be made to ensure access to academic programs, activities, services, and employment in accordance with 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 standards. If you need accommodations, contact your campus Disabilities Specialist.

Scholarships - Scholarship information can be found at <http://www.fvtc.edu/community-alumni/foundation-alumni/scholarships>

Advisement - Students may have academic advisors assigned to them to assist them in academic issues such as determining appropriate classes, sequencing of courses for degree completion, and registration activities. Students can find their Academic Advisor through MyFVTC or by contacting Student Services.

Safety Policies

Lab and Classroom Safety Faculty members will go over safety rules during the first week of classes. Safety precautions should be observed at all times. Shoes and shirts are required at all times in college buildings. Rules and regulations are made for the well-being of all students.

General Safety

1. You are responsible for the purchase and maintenance of your safety supplies. If you show up to class without these supplies, you will not be allowed to participate in lab activities and will be marked **tardy** or **absent**.
2. Horseplay or any intentional unsafe behaviors will result in disciplinary action up to and including removal from the program and receiving F grades for all courses.
3. Fighting or threatening students, peers, instructors, or other FVTC staff will not be tolerated and will result in disciplinary action up to and including removal from the program and receiving failing grades for all courses.
4. Do not run.
5. Equipment must be returned to its proper place immediately after use.
6. Only authorized personnel should use tools and equipment.
7. Do not operate equipment without the faculty member's permission.
8. If machinery is faulty, call it to the attention of the faculty member immediately.
9. Toxic material bulletins must be observed. In the event of a toxic material spill, report it immediately to your faculty member.
10. If anything is spilled on the floor, proper procedures must be followed. If safe, clean it up immediately.
11. Always use proper equipment and protective clothing for the task you are performing.
12. Propane lighters are not allowed in lab areas.

Cleanup Policy

Cleanup is essential for a safe and productive work environment. As mentioned before, you will be counted as **tardy** or **absent** and points taken away from your participation grade if you do not join in cleanup. Cleanup includes, but is not limited to, the following **every day**:

- If you use a computer, be sure to log off and turn power off to the monitor.
- Welders turned off, gases shut off, and cords wrapped up in correct location
- Booth and student tools returned to their proper place
- Electrodes and metal (new and used) put in their proper location
- Used electrodes and metal thrown in the appropriate dumpsters.
- Booth table tops ground off at the end of **each** class period
- Booth and breezeways swept
- Grinding and cutting rooms swept
- Metal picked up and put away from behind the shear
- Chips and metal cleaned up on both saws
- Ironworker metal cleaned up
- Tabletops cleaned off and tools put away
- Floor swept in fabrication lab
- Everything has a place. If something is out of place, put it where it belongs. If you don't know where it belongs, ask an instructor.

Cell Phone Policy

Cell phones may be used in public areas. Cell phone misuse constitutes a breach of code of conduct and may result in disciplinary action.

Please respect the intent of the learning environment and your fellow classmates by turning cell phones off when in class or the library. Receiving calls or texting during class time (discussion or lab) will result in a reduced participation grade for each occurrence.

If you must have your cell phone on for emergency purposes, inform your instructor.

Cell phones are not allowed for activities or tests that require a calculator.

Student Handbook Link

Above and beyond the course rules and policies listed above, students must also adhere to rules and policies set forth by FVTC. A link to those policies can be found below or by referencing the student handbook.

<http://www.fvtc.edu/myfvtc/student-forms-policies>

Fox Valley Technical College

10621108 Weld Print Reading

Course Design

Course Information

Description	Provides practice in reading shop drawings. Topics include orthographic projection, auxiliary views, revolved sections, surface and centerline relationships, isometric drawings, scale drawing and tolerances.
Career Cluster	Manufacturing
Instructional Level	Associate Degree
Total Credits	1.00
Total Hours	27.00

Types of Instruction

Instruction Type	Credits/Hours
Classroom / Lab	1 Credit / 27 Hours

Purpose/Goals

Interpret the arrangement of lines, views and notes used on welding drawings.

Decipher dimensions, material specifications, and fasteners used on assembly prints.

Target Population

This course is intended for program codes: 20-442-1 Welding Certificate, 30-442-1 Production Welding Technical Diploma, 31-457-1 1 Year Welding/Metal Fabrication Technical Diploma, 32-621-1 2 Year Welding/Metal Fabrication Technical Diploma, and 10-621-1 Industrial Welding Technology Associate Degree.

Textbooks

J.R Walker & W.R. Polanin. *Welding Print Reading*. 6th edition. ISBN 978-1-60525-911-6.

Employability Essentials

1. Act Responsibly - Apply ethical standards in both personal and professional behavior.
2. Adapt to Change - Anticipate changes and positively respond to them.
3. Communicate Effectively and Respectfully - Apply appropriate writing, speaking, and listening skills across various settings to engage diverse audiences.
4. Think Critically and Creatively - Apply independent and rigorous reasoning that leads to informed decisions, innovation and personal empowerment.
5. Work Collaboratively - Work collaboratively with others to complete tasks, solve problems, resolve conflicts, provide information, and offer support.

Course Competencies

1. Explain course expectations.

Linked Employability Essentials

Communicate Effectively and Respectfully - Apply appropriate writing, speaking, and listening skills across various settings to engage diverse audiences.

Assessment Strategies

- 1.1. Discussion participation

Criteria

Your performance will be successful when:

- 1.1. you identify the course information.
- 1.2. you identify instructor information.
- 1.3. you identify the course description.
- 1.4. you identify the prerequisites and corequisites.
- 1.5. you identify the textbook requirements.
- 1.6. you explain the required course supplies.
- 1.7. you express the college employability essentials.
- 1.8. you recognize the course competencies.
- 1.9. you identify the course timeline.
- 1.10. you explain the course grading procedures.
- 1.11. you detail the attendance policy.
- 1.12. you describe academic integrity.
- 1.13. you utilize the guidelines for success.
- 1.14. you recognize safety policies.
- 1.15. you identify cleanup policies.
- 1.16. you describe final cleanup expectations.
- 1.17. you identify the cell phone policy.
- 1.18. you describe the location of important school documentation.

Learning Objectives

- 1.a. Reference course requirements.

2. Evaluate the significance of print reading in manufacturing.

Linked Employability Essentials

Communicate Effectively and Respectfully - Apply appropriate writing, speaking, and listening skills across various settings to engage diverse audiences.
Think Critically and Creatively - Apply independent and rigorous reasoning that leads to informed decisions, innovation and personal empowerment.

Assessment Strategies

- 2.1. Discussion participation
- 2.2. Completion of print reading introduction and purpose classroom activities
- 2.3. Completion of print reading introduction and purpose homework activities

Criteria

Your performance will be successful when:

- 2.1. you explain why prints are used in industry.
- 2.2. you explain Computer Aided Drafting (CAD).
- 2.3. you compare CAD drawings to hand-drafted sketches.
- 2.4. you identify printers and plotters.
- 2.5. you explore the use of xerography, microfilm, Diazo, and blueprint processes to reproduce prints.
- 2.6. you identify part orientation.
- 2.7. you interpret welding processes, sizes, finish, and joint configurations.
- 2.8. you identify filler metal specifications.
- 2.9. you explore print storage and handling methods and concerns.

Learning Objectives

- 2.a. Navigate a reference textbook.
- 2.b. Detail the processes for developing and reproducing prints.
- 2.c. Describe print nomenclature.
- 2.d. Evaluate welding information found on a print.
- 2.e. Detail print care precautions.
- 2.f. Analyze prints and their physical counterpart.

3. Interpret industrial weld prints.

Linked Employability Essentials

Communicate Effectively and Respectfully - Apply appropriate writing, speaking, and listening skills across various settings to engage diverse audiences.

Think Critically and Creatively - Apply independent and rigorous reasoning that leads to informed decisions, innovation and personal empowerment.

Assessment Strategies

- 3.1. Discussion participation
- 3.2. Completion of welding prints classroom activities
- 3.3. Completion of welding prints homework activities
- 3.4. Completion of welding prints online activities
- 3.5. Completion of welding prints tests

Criteria

Your performance will be successful when:

- 3.1. you identify visible, hidden, center, and section lines.
- 3.2. you identify cutting and viewing plane lines.
- 3.3. you identify short, long, and round break lines.
- 3.4. you identify extension, dimension, leader, and phantom lines.
- 3.5. you interpret title block information as a first step in viewing a print.
- 3.6. you interpret notes and specifications as a second step in viewing a print.
- 3.7. you identify part shape and orientation as a third step in viewing a print.
- 3.8. you determine overall part size as the fourth step in viewing a print.
- 3.9. you compare 3rd and 1st angle orthographic projection.
- 3.10. you compare isometric and oblique drawings.
- 3.11. you compare auxiliary, enlarged detail, and development views.
- 3.12. you compare thin, full, half, revolved, removed, offset, and broken-out section views.
- 3.13. you interpret fractional, decimal, metric, and dual-dimensions.
- 3.14. you identify part name, revision record, order number, material type, scale size, general specifications, drawn by information, checked by information, drawing number, drawing date, tolerances, company name, quantity required, number of sheets in series, heat treatment, and projection type with a title block.
- 3.15. you interpret local and general notes.
- 3.16. you classify sheet sizes A, B, C, D, E and custom sizes.
- 3.17. you locate print zones.
- 3.18. you acknowledge security classifications.
- 3.19. you summarize the duties of production, job shop, and maintenance welders.
- 3.20. you compare freehand sketch, detail, main/top assembly, subassembly, detail-assembly, erection, and process specific prints.
- 3.21. you interpret a bill of materials, material list, or schedule of parts.
- 3.22. you interpret part list balloon information.
- 3.23. you interpret size, location, geometric characteristic, and surface texture dimensions.
- 3.24. you identify broken-chain, chain, reference, datum, zero plane, coordinate plane, angular, diameter, radius, and GD&T dimensioning methods.
- 3.25. you interpret the major diameter, pitch, thread series, and class of fit for threaded fasteners.
- 3.26. you reference a tap drill chart.
- 3.27. you compare bolts, nuts, cap screws, machine screws, weld nuts, studs, and bosses.

Learning Objectives

- 3.a. Explore lines types used on manufacturing prints.
- 3.b. Explore the views used to depict parts on manufacturing prints.
- 3.c. Discover methods to read prints.
- 3.d. Interpret print formats used on manufacturing drawings.
- 3.e. Interpret title block information.
- 3.f. Classify the types of skilled welders.
- 3.g. Compare the types of working drawings.
- 3.h. Explore information found on a parts list.
- 3.i. Interpret linear and angular dimensions on a print.
- 3.j. Explore the geometric dimensions and tolerances (GD&T) system.
- 3.k. Explore the use of threaded fasteners on manufacturing drawings.
- 3.l. Select a tap drill for a specified thread form.

4. Explore structural metal components used in manufacturing.

Linked Employability Essentials

Communicate Effectively and Respectfully - Apply appropriate writing, speaking, and listening skills across various settings to engage diverse audiences.

Think Critically and Creatively - Apply independent and rigorous reasoning that leads to informed decisions, innovation and personal empowerment.

Work Collaboratively - Work collaboratively with others to complete tasks, solve problems, resolve conflicts, provide information, and offer support.

Assessment Strategies

- 4.1. Discussion participation
- 4.2. Completion of structural metals classroom activities
- 4.3. Completion of structural metals homework activities
- 4.4. Completion of structural metals online activities
- 4.5. Completion of structural metals test

Criteria

Your performance will be successful when:

- 4.1. you classify the methods to create structural metal shapes as cutting, machining, bending, rolling, spinning, stamping, drawing, casting, forging, and extruding.
- 4.2. you explain toughness, malleable, and tensile strength.
- 4.3. you categorize structural materials as ferrous, nonferrous, alloys, and pure metals.
- 4.4. you identify web, flange, flat, leg, thickness, width, length, depth, stem, wall, and diameter.
- 4.5. you compare hot and cold rolled materials.
- 4.6. you compare square, rectangular, hex, octagon, and round bar.
- 4.7. you compare sheet and plate.
- 4.8. you compare angle, tee, and channel shapes.
- 4.9. you compare round tube, pipe, and hollow structural sections.
- 4.10. you compare W, M, HP, and S beams.
- 4.11. you identify military, AISI, ASME, ASTM, and corporate designed metal specifications.

Learning Objectives

- 4.a. Compare the structural shapes metals are manufactured in.
- 4.b. Define common metals and structural shape terminology.
- 4.c. Identify the characteristics of metals being welded.
- 4.d. Identify organizations that provide metal specifications.

Course Learning Plans and Performance Assessment Tasks

Course Expectations

Target Competencies

1. Explain course expectations.

Assessment Strategies

- 1.1. Discussion participation

Criteria

Your performance will be successful when:

- 1.1. you identify the course information.
- 1.2. you identify instructor information.
- 1.3. you identify the course description.
- 1.4. you identify the prerequisites and corequisites.
- 1.5. you identify the textbook requirements.
- 1.6. you explain the required course supplies.
- 1.7. you express the college employability essentials.
- 1.8. you recognize the course competencies.
- 1.9. you identify the course timeline.
- 1.10. you explain the course grading procedures.
- 1.11. you detail the attendance policy.
- 1.12. you describe academic integrity.
- 1.13. you utilize the guidelines for success.
- 1.14. you recognize safety policies.
- 1.15. you identify cleanup policies.
- 1.16. you describe final cleanup expectations.
- 1.17. you identify the cell phone policy.
- 1.18. you describe the location of important school documentation.

Learning Objectives

- 1.a. Reference course requirements.

Learning Activities

1. Read course syllabus documentation.
2. Participate in classroom discussion on course requirements.

Evaluating the Significance of Print Reading in Manufacturing

Target Competencies

1. Evaluate the significance of print reading in manufacturing.

Assessment Strategies

- 1.1. Discussion participation
- 1.2. Completion of print reading introduction and purpose classroom activities
- 1.3. Completion of print reading introduction and purpose homework activities

Criteria

Your performance will be successful when:

- 1.1. you explain why prints are used in industry.
- 1.2. you explain Computer Aided Drafting (CAD).
- 1.3. you compare CAD drawings to hand-drafted sketches.
- 1.4. you identify printers and plotters.

- 1.5. you explore the use of xerography, microfilm, Diazo, and blueprint processes to reproduce prints.
- 1.6. you identify part orientation.
- 1.7. you interpret welding processes, sizes, finish, and joint configurations.
- 1.8. you identify filler metal specifications.
- 1.9. you explore print storage and handling methods and concerns.

Learning Objectives

- 1.a. Navigate a reference textbook.
- 1.b. Detail the processes for developing and reproducing prints.
- 1.c. Describe print nomenclature.
- 1.d. Evaluate welding information found on a print.
- 1.e. Detail print care precautions.
- 1.f. Analyze prints and their physical counterpart.

Learning Activities

- 1. Read print reading introduction and purpose documentation.
- 2. Participate in print reading introduction and purpose discussion.
- 3. Complete print reading introduction and purpose classroom activities.
- 4. Complete print reading introduction and purpose homework activity.

Interpreting Industrial Weld Prints

Target Competencies

- 1. Interpret industrial weld prints.

Assessment Strategies

- 1.1. Discussion participation
- 1.2. Completion of welding prints classroom activities
- 1.3. Completion of welding prints homework activities
- 1.4. Completion of welding prints online activities
- 1.5. Completion of welding prints tests

Criteria

Your performance will be successful when:

- 1.1. you identify visible, hidden, center, and section lines.
- 1.2. you identify cutting and viewing plane lines.
- 1.3. you identify short, long, and round break lines.
- 1.4. you identify extension, dimension, leader, and phantom lines.
- 1.5. you interpret title block information as a first step in viewing a print.
- 1.6. you interpret notes and specifications as a second step in viewing a print.
- 1.7. you identify part shape and orientation as a third step in viewing a print.
- 1.8. you determine overall part size as the fourth step in viewing a print.
- 1.9. you compare 3rd and 1st angle orthographic projection.
- 1.10. you compare isometric and oblique drawings.
- 1.11. you compare auxiliary, enlarged detail, and development views.
- 1.12. you compare thin, full, half, revolved, removed, offset, and broken-out section views.
- 1.13. you interpret fractional, decimal, metric, and dual-dimensions.
- 1.14. you identify part name, revision record, order number, material type, scale size, general specifications, drawn by information, checked by information, drawing number, drawing date, tolerances, company name, quantity required, number of sheets in series, heat treatment, and projection type with a title block.
- 1.15. you interpret local and general notes.
- 1.16. you classify sheet sizes A, B, C, D, E and custom sizes.
- 1.17. you locate print zones.
- 1.18. you acknowledge security classifications.
- 1.19. you summarize the duties of production, job shop, and maintenance welders.

- 1.20. you compare freehand sketch, detail, main/top assembly, subassembly, detail-assembly, erection, and process specific prints.
- 1.21. you interpret a bill of materials, material list, or schedule of parts.
- 1.22. you interpret part list balloon information.
- 1.23. you interpret size, location, geometric characteristic, and surface texture dimensions.
- 1.24. you identify broken-chain, chain, reference, datum, zero plane, coordinate plane, angular, diameter, radius, and GD&T dimensioning methods.
- 1.25. you interpret the major diameter, pitch, thread series, and class of fit for threaded fasteners.
- 1.26. you reference a tap drill chart.
- 1.27. you compare bolts, nuts, cap screws, machine screws, weld nuts, studs, and bosses.

Learning Objectives

- 1.a. Explore lines types used on manufacturing prints.
- 1.b. Explore the views used to depict parts on manufacturing prints.
- 1.c. Discover methods to read prints.
- 1.d. Interpret print formats used on manufacturing drawings.
- 1.e. Interpret title block information.
- 1.f. Classify the types of skilled welders.
- 1.g. Compare the types of working drawings.
- 1.h. Explore information found on a parts list.
- 1.i. Interpret linear and angular dimensions on a print.
- 1.j. Explore the geometric dimensions and tolerances (GD&T) system.
- 1.k. Explore the use of threaded fasteners on manufacturing drawings.
- 1.l. Select a tap drill for a specified thread form.

Learning Activities

- 1. Read welding prints documentation.
- 2. Watch welding prints videos.
- 3. Participate in welding prints discussions.
- 4. Complete welding prints classroom activities.
- 5. Complete welding prints homework activities.
- 6. Complete welding prints online activities.

Exploring Structural Metal Components Used in Manufacturing

Target Competencies

- 1. Explore structural metal components used in manufacturing.

Assessment Strategies

- 1.1. Discussion participation
- 1.2. Completion of structural metals classroom activities
- 1.3. Completion of structural metals homework activities
- 1.4. Completion of structural metals online activities
- 1.5. Completion of structural metals test

Criteria

Your performance will be successful when:

- 1.1. you classify the methods to create structural metal shapes as cutting, machining, bending, rolling, spinning, stamping, drawing, casting, forging, and extruding.
- 1.2. you explain toughness, malleable, and tensile strength.
- 1.3. you categorize structural materials as ferrous, nonferrous, alloys, and pure metals.
- 1.4. you identify web, flange, flat, leg, thickness, width, length, depth, stem, wall, and diameter.
- 1.5. you compare hot and cold rolled materials.
- 1.6. you compare square, rectangular, hex, octagon, and round bar.

- 1.7. you compare sheet and plate.
- 1.8. you compare angle, tee, and channel shapes.
- 1.9. you compare round tube, pipe, and hollow structural sections.
- 1.10. you compare W, M, HP, and S beams.
- 1.11. you identify military, AISI, ASME, ASTM, and corporate designed metal specifications.

Learning Objectives

- 1.a. Compare the structural shapes metals are manufactured in.
- 1.b. Define common metals and structural shape terminology.
- 1.c. Identify the characteristics of metals being welded.
- 1.d. Identify organizations that provide metal specifications.

Learning Activities

1. Read structural metals documentation.
2. Participate structural metals discussions.
3. Complete structural metals classroom activities.
4. Complete structural metals homework activities.
5. Complete structural metals online activities.

Name of Class:	Print Reading		
Catalog/State Course #:	10-621-108		
Instructor Name:	Craig Schmidt	Office:	F194
Email:	schmidtc@fvtc.edu	Phone:	920-232-6056
Office Hours:	Wednesday 2:00pm – 4:00pm		
Class Number:	WAT109 / WAT111	Credits:	1
Day(s) of Week:	Wednesday	Class Time:	4:00pm – 8:50pm
Start/End Dates:	3/26/2020 – 4/1/2020	Weeks:	5
Location:	Wautoma		
Textbook:	J.R Walker & W.R. Polanin. <i>Welding Print Reading</i> . 6th edition. ISBN 978-1-60525-911-6.		
Supplies Needed:	Click here to enter text.		

Technical Skills/Equipment Needed

Safety Glasses	Z87+ approved with side shields (prescription safety glasses okay with clip on side shields) are required .
Work Shoes/Boots	Safety toe leather work shoes or boot are required . Tennis shoes are not allowed in the shop.
Gloves	1pr – Leather Work
Tape Measure	10-12ft. is recommended. Look for a ¾” wide blade with 1/32” graduations. Avoid carpenter’s tape measures.
Caliper	6” dial or digital with measurement down to 0.001”
Calculator	Ti-30Xa or equivalent
USB Flash Drive	Any size should work. Look for 2GB or bigger.

Blackboard Support: email - online@fvtc.edu Phone: (920) 735-4816

Communication Policy

My preferred method of communication is in person during my office hours, the secondary method is email. I respond to email messages within 24 hours on Monday through Friday and periodically on weekends.

Grading Policy

All reading assignments, written worksheets, lab assignments, and other class work must be completed if you expect a passing grade. Attending discussions is essential for passing written tests. Your grade is derived from the completion of worksheets, exams, laboratory projects, and classroom and on-line participation. Exam and lab scores are calculated at the end of the semester to find your course score. Grades for tests, worksheets, other assignments, as well as the course itself are based on percentages. Letter grades are assigned to those percentages based on how well you have achieved the course objectives. At the end of the term, you will receive your individual letter grades and a grade point average (GPA). Your GPA is computed by finding the point value assigned to each letter grade (i.e. A=4.00, A-=3.67, etc). Letter grades are given the following grade point values:

Grading Scale

A = 100 - 95

B+ = 92.49 - 90.00

B- = 87.49 - 85.0

C = 82.49 - 80.0

D+ = 77.49 - 75.0

D- = 72.49 - 70.0

A- = 94.99 - 92.5

B = 89.99 - 87.5

C+ = 84.99 - 82.5

C- = 79.99 - 77.5

D = 74.99 - 72.5

F = <70.00

Breakdown of Grade

All coursework for this class is weighted. That means, regardless of the point value awarded for individual assignments, the entire category an assignment falls into is given more or less grade “weight” as the instructor sees fit. Category weight for this course is as follows:

Work Habits	10%
Participation	10%
Classroom Assignments	40%
Tests	40%
Total	100%

Assignment/Exam Policy

Late work will only be accepted with prior approval from the instructor. Late work may be reduced by one full grade or 10%.

Department/Program Grade Expectations

Work habits are assessed based on your professionalism during the class. A reduction to the work habits grade is at the discretion of the instructor. The severity of the infraction can warrant a reduction of 1-5 points per occurrence. It is important to realize that your work habits in this course can drastically affect your final grade. This includes but is not limited to:

- Showing up to class on time
- Attending class regularly
- Being prepared for class
- Not being disruptive during class or break times
- Using class time and time outside of class effectively
- Contributing to classroom and Blackboard discussions
- Keeping a positive attitude during class time
- Upholding personal integrity and ethical decision making
- Keeping to assignment schedules
- Admitting mistakes
- Performing tasks to the best of abilities

You are responsible to keep track of your course progress. You can track your grade and progress by checking the Gradebook section in Blackboard. As assignments are completed and graded, your instructor will update your course grade. Nonetheless, you should have the instructor sign and date your copy of lab exercises and assignment sheets. Keep signed copies of assignments until after the course ends to ensure you have proof of completing an assignment if the instructor forgets to enter the grade.

The instructor will be the only one who checks off your progress in Blackboard Gradebook. Under no circumstances shall a student have access to the instructor's Gradebook program.

If you miss a section discussion, section review, or test review, **it is your responsibility** to make the necessary arrangements to get the missed information. You will not be excused from taking a test because you were absent the previous class period. Your grade at the conclusion of the course will be determined on what you have completed. Any incomplete worksheets, labs, or missed tests **will be factored into your grade**.

Make-up for missed tests must be complete within one (1) week following the missed test. After one (1) week, the test will be scored as a zero (0).

Assignments, labs, and homework not complete by their date due will be recorded as a zero (0).

Circumstances may present themselves which require a student to withdraw from a course. If you must withdraw from this course for any reason, it is in your best interest financially to talk with your instructor regarding the procedure to withdraw. If you do not, there is a chance you may be held liable for course fees even if you stop attending class. If you stop coming to class, that does not mean you are withdrawn, and you will likely receive a failing grade at the end of the semester. You are responsible for taking the necessary action to withdraw yourself from the class through a student advisor or the MyFVTC portal.

If situations arise where you need an extension for this course, you must talk with your instructor ahead of time to make accommodations. There are very few circumstances that would warrant a course extension. Your best option is to show up on time each day and complete coursework when it is due.

There are 1st semester pre-requisites for 2nd semester courses. You need to pass pre-requisite courses in order to take future courses.

Student Effort: In order to meet the course requirements, you should expect approximately two hours of outside class work for every one hour of effort in the classroom. In lab courses, you can generally expect to spend one hour of outside effort for every two hours in the lab. This will allow you to fully prepare and review necessary course activities.

Online Content Outline and Schedule - 2 Credits (see notes at bottom of schedule)

Dates	Topics/Blackboard Location	Work Due	Estimated Effort (hours)
Week 1	Section 1 Intro/purpose	<ul style="list-style-type: none"> • Review section objectives • Review and participate in slides • Section activities 	7.78
Week 2	Section 2 Line types	<ul style="list-style-type: none"> • Review section objectives • Review and participate in section slides • Review relevant section information • Section activities • Section Gamma+ • Take section test 	7.78
Week 3	Section 3 Print Views	<ul style="list-style-type: none"> • Review section objectives • Review and participate in section slides • Section activities • Section Gamma+ • Take section test 	7.78
Week 4	Section 4 Print Formatting	<ul style="list-style-type: none"> • Review section objectives • Review and participate in section slides • Section activities • Section Gamma+ • Take section test 	7.78
Week 5	Section 5 Print types	<ul style="list-style-type: none"> • Review section objectives • Review and participate in section slides • Section activities • Section Gamma+ • Take section test 	7.78
Week 6	Section 6 Dimensioning	<ul style="list-style-type: none"> • Review section objectives • Review and participate in section slides • Watch videos • Section activities • Section Gamma+ • Take section test 	7.78
Week 7	Section 7 Fasteners	<ul style="list-style-type: none"> • Review section objectives • Review and participate in section slides • Review relevant information • Watch videos • Section activities • Section Gamma+ • Take section test 	7.78
Week 8	Section 8 Structural Metals	<ul style="list-style-type: none"> • Review section objectives • Review and participate in section slides • Section activities • Section Gamma+ • Take section test 	7.78

Attendance Policy

To be early is to be on time.

You will need to perform the skills you will learn in this course on the job. You will also be expected to act as though you are on the job any time you are on a FVTC campus.

Participation in classroom and lab activities account for a portion of your grade in this course. If you are tardy or absent, you are not able to participate in classroom or lab activities. This will in turn effect your participation grade.

Classes start **sharply** at their designated time. If a class starts at 12pm, walking through the door at 12 noon and 1 second will render you tardy. We start our class discussions right away. Coming in late disrupts the classroom and causes lost class time.

If you are going to be tardy or absent, you are required to call or e-mail your instructor at least ten (10) minutes prior to class starting.

You are considered **tardy** if you arrive after the start of class.

If you are **tardy** 3 times in any one class, you may receive a failing grade for the class.

If you leave the classroom or lab before you are dismissed, you will be marked as being **tardy**.

If you are tardy for more than 10% of a class, you may receive a failing grade for the class. (72 hour = 7.2 unexcused hours per course).

If you are not present for class, you are considered **absent**.

If you are **absent** due to illness or another reason, you must contact your instructor at least ten (10) minutes before the start of class.

If you know you will be **absent** ahead of time or for an extended period of time, you must get the absence approved by your instructor.

If you are **absent** for 2 or more consecutive days, you are required to bring in a written excuse for the time you missed.

If you have unexcused **absences, tardies**, or a combination of the two totaling more than 10% of a class, you may receive a failing grade for the class. (72 hour = 7.2 unexcused hours per course).

If you are absent and do not call in (**no call/no show**), you will be docked 2 days as if you were absent. If you are **no call/no show** 2 times, you may receive a failing grade for the class.

Of course, there might be extenuating circumstances. These will be evaluated by the instructor on a one-on-one basis. It is your responsibility to inform the instructor of your individual situation.

Student Resources/Support: (*Note: Underlined items are hyperlinks to the FVTC College resources and/or policies.*)

- [Campus Safety & Security](#) - Life threatening 911 / Emergency (920) 735-4777 / Non-emergency (920) 735-5691
- [Support Services](#) - There is a broad network of support services for you at Fox Valley Technical College; see them at this link that takes you to the Help and Resources Tab in Blackboard.
- [Tutoring/Writing Assistance](#) - The Teaching and Learning Center (TLC) and Write Way are services to assist you with tutoring and writing assistance services; see the For Students tab in Blackboard.
- [Course Withdrawal](#) - If you choose to withdraw from the course, please contact me and enrollment services to ensure you are aware of the impact to your Academic and Financial Aid GPAs.

- **Equal Opportunity** - Fox Valley Technical College is committed to ensuring equal access to its educational programs and employment opportunities without regard to sex, gender, race, color, national origin, religion, age, disability, gender identity, sexual orientation, genetic characteristics, marital status, or military status.
 - **ADA** - FVTC provides a wide range of supplemental services to ensure reasonable accommodations to the known physical or mental limitations of qualified individuals with disabilities. To obtain more information or request accommodations, contact FVTC's Student Services' Educational Support Center at (920) 735-5679 Voice/TTY.
 - **Title IX** - FVTC prohibits all forms of illegal gender and sex-based discrimination, which includes acts of sexual violence, sexual harassment, domestic violence, dating violence, and stalking. To report a Title IX concern, contact Security Services at (920) 735-5691 or (920) 993-5177. [Sexual Misconduct Policy](#)

Student Conduct

- [Academic and General Codes of Conduct](#) - Please review this document to understand your rights and responsibilities as a student
- **Plagiarism and Academic Conduct** - Plagiarism and Academic Conduct - Fox Valley Technical College prohibits all forms of academic dishonesty. Violations are subject to the college conduct process. See the student handbook for more information.
- [Acceptable Use of Computers and Electronic Devices](#)

Student Expectations

When students enter college, they take upon themselves certain responsibilities and obligations, including satisfactory academic performance and social behavior consistent with the lawful purposes of the college. Student conduct, therefore, is not considered in isolation within the college community but as an integral part of the education process. All students are expected to know and abide by this code of student conduct. Any student found to have committed or to have attempted to commit misconduct is subject to disciplinary sanctions.

The Student Code of Conduct is available in the Student Handbook and through the Student Life office and details sanctions, appeal process, and procedures if a student violates this code.

Be prepared to work when you show up for class, and be sure you have all the needed equipment. If you do not have your equipment, you may be sent home and marked as **tardy** or **absent**. This includes but not limited to; writing utensils, books, safety supplies, proper work clothing, etc.

When someone is speaking, listen with respect. Do not talk when you are supposed to be listening.

Participate in discussions. You will learn more, and participation is a portion of your grade.

Always be patient with yourself and others. If you must leave the room, leave quietly.

Disruptive behavior during classroom discussions or activities will not be tolerated. Any student deemed disruptive by the instructor will be asked to leave for the duration of the period and marked absent. Ongoing disruptive behavior will result in disciplinary action.

No food will be allowed in the classroom at any time. Only drinks with a **sealable cap** are allowed in the classroom and shop. No fast food cups or coffee mugs are allowed if the lid can easily come off. If you spill your drink, it is your responsibility to clean it up.

Cheating, lying, or stealing will be grounds for immediate failure from the course and dismissal from the program.

This includes:

- Welding, chipping, brushing, and grinding in a position other than the assigned welding position
- Turning in work completed by another student
- Copying another student's test, exam, or assignment
- Copying files from another student and turning them in as one's own work

Work only on the projects for the course. Extra projects may be allowed from time to time, but only with the approval of your instructor. Do not assume you can make trailers, tree stands, car parts, etc.

You are expected to keep your lab/theory manual in an organized manner at all times, because if it is neat and in order you can find information faster. Inability to participate in classroom or lab discussions because of disorganization will result in a reduced participation grade for each occurrence.

Loud or rude language in the hallways will be grounds for dismissal from the day's activities and will affect your participation grade. There are other classes and offices being used while you attend school, so it is important to be courteous to others.

FVTC campuses and grounds are non-tobacco facilities. Per FVTC policy, smoking or chew will only be allowed **inside** your vehicle. Butts are to be disposed of in your vehicle, not on the ground outside the building or parking lot.

Garbage shall also be disposed of properly. Do not throw trash on the ground outside the building. Clean up your mess in the classroom. If you leave behind trash, you will be docked participation points.

Guidelines for Success

Accommodations for Persons with Disabilities - Reasonable accommodations for persons with disabilities will be made to ensure access to academic programs, activities, services, and employment in accordance

with 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 standards. If you need accommodations, contact your campus Disabilities Specialist.

Scholarships - Scholarship information can be found at <http://www.fvtc.edu/community-alumni/foundation-alumni/scholarships>

Advisement - Students may have academic advisors assigned to them to assist them in academic issues such as determining appropriate classes, sequencing of courses for degree completion, and registration activities. Students can find their Academic Advisor through MyFVTC or by contacting Student Services.

Safety Policies

Lab and Classroom Safety Faculty members will go over safety rules during the first week of classes. Safety precautions should be observed at all times. Shoes and shirts are required at all times in college buildings. Rules and regulations are made for the well-being of all students.

General Safety

1. You are responsible for the purchase and maintenance of your safety supplies. If you show up to class without these supplies, you will not be allowed to participate in lab activities and will be marked **tardy** or **absent**.
2. Horseplay or any intentional unsafe behaviors will result in disciplinary action up to and including removal from the program and receiving F grades for all courses.
3. Fighting or threatening students, peers, instructors, or other FVTC staff will not be tolerated and will result in disciplinary action up to and including removal from the program and receiving failing grades for all courses.
4. Do not run.
5. Equipment must be returned to its proper place immediately after use.
6. Only authorized personnel should use tools and equipment.
7. Do not operate equipment without the faculty member's permission.
8. If machinery is faulty, call it to the attention of the faculty member immediately.
9. Toxic material bulletins must be observed. In the event of a toxic material spill, report it immediately to your faculty member.
10. If anything is spilled on the floor, proper procedures must be followed. If safe, clean it up immediately.
11. Always use proper equipment and protective clothing for the task you are performing.
12. Propane lighters are not allowed in lab areas.

Cleanup Policy

Cleanup is essential for a safe and productive work environment. As mentioned before, you will be counted as **tardy** or **absent** and points taken away from your participation grade if you do not join in cleanup. Cleanup includes, but is not limited to, the following **every day**:

- Welders turned off, gases shut off, and cords wrapped up in correct location
- Booth and student tools returned to their proper place
- Electrodes and metal (new and used) put in their proper location
- Used electrodes and metal thrown in the appropriate dumpsters.
- Booth table tops ground off at the end of **each** class period

- Booth and breezeways swept
- Grinding and cutting rooms swept
- Metal picked up and put away from behind the shear
- Chips and metal cleaned up on both saws
- Ironworker metal cleaned up
- Tabletops cleaned off and tools put away
- Floor swept in fabrication lab
- Everything has a place. If something is out of place, put it where it belongs. If you don't know where it belongs, ask an instructor.

Cell Phone Policy

Cell phones may be used in public areas. Cell phone misuse constitutes a breach of code of conduct and may result in disciplinary action.

Please respect the intent of the learning environment and your fellow classmates by turning cell phones off when in class or the library. Receiving calls or texting during class time (discussion or lab) will result in a reduced participation grade for each occurrence.

If you must have your cell phone on for emergency purposes, inform your instructor.

Cell phones are not allowed for activities or tests that require a calculator.

Student Handbook Link

Above and beyond the course rules and policies listed above, students must also adhere to rules and policies set forth by FVTC. A link to those policies can be found below or by referencing the student handbook.

<http://www.fvtc.edu/myfvtc/student-forms-policies>

Amendment to Syllabus

Any changes to the information in the syllabus affecting the course, or course content will be announced by the instructor. Changes to the course policies may occur due to extenuating circumstances.

Course Description

Provides practice in reading shop drawings. Topics include orthographic projection, auxiliary views, revolved sections, surface and centerline relationships, isometric drawings, scale drawing and tolerances.

Prerequisites

None

Course Competencies: All students should be competent in the following knowledge, skills, and behaviors by the end of this course.

- Explain course expectations.
- Evaluate the significance of print reading in manufacturing.
- Interpret industrial weld prints.
- Explore structural metal components used in manufacturing.

Employability Essentials: FVTC works closely with area employers to ensure our students are learning the skills needed in today's competitive workplace. In addition to technical skills, you will also learn and practice the following Employability Essentials—the skills and behaviors employers want in the workplace.

- Adapt to Change
- Think Critically and Creatively
- Work Collaboratively
- Communicate Effectively and Respectfully
- Act Responsibility

Amendment to Syllabus

Any changes to the information in the syllabus affecting the course, or course content will be announced by the instructor. Changes to the course policies may occur due to extenuating circumstances.



Fox Valley Technical College

10621114 Weld Symbols

Course Design

Course Information

Description	Teaches students to interpret detailed weld symbols using the American Welding Society standard.
Career Cluster	Manufacturing
Instructional Level	Associate Degree
Total Credits	1.00
Total Hours	27.00

Types of Instruction

Instruction Type	Credits/Hours
On-Campus Laboratory	0.5 Credit / 18.00 Hours
On- Campus Lecture	0.5 Credit / 9.00 Hours

Purpose/Goals

- Analyze the nomenclature of a welding symbol.
- Identify weld symbols.
- Locate elements of a welding symbol.
- Interpret elements of a welding symbol.
- Select appropriate weld symbol for basic joints.
- Identify supplemental weld information included on a welding symbol.
- Interpret nondestructive testing symbols.

Target Population

This course is intended for program codes: 20-442-1 Welding Certificate, 30-442-1 Production Welding Technical Diploma, 31-457-1 1 Year Welding/Metal Fabrication Technical Diploma, 32-621-1 2 Year Welding/Metal Fabrication Technical Diploma, and 10-621-1 Industrial Welding Technology Associate Degree.

Pre/Corequisites

Corequisite Weld/Metal Fab Intro & Safety - 10621105

Textbooks

Walker, John R. and Polanin, W. Richard. *Welding Print Reading*. **Publisher:** The Goodheart-Willcox Company, Inc. **ISBN:** 978-1-60525-911-6. **Edition:** 6th.

Employability Essentials

1. Act Responsibly - Apply ethical standards in both personal and professional behavior.
2. Adapt to Change - Anticipate changes and positively respond to them.
3. Communicate Effectively and Respectfully - Apply appropriate writing, speaking, and listening skills across various settings to engage diverse audiences.
4. Think Critically and Creatively - Apply independent and rigorous reasoning that leads to informed decisions, innovation and personal empowerment.
5. Work Collaboratively - Work collaboratively with others to complete tasks, solve problems, resolve conflicts, provide information, and offer support.

Course Competencies

1. Explain course expectations.

Linked Employability Essentials

Communicate Effectively and Respectfully - Apply appropriate writing, speaking, and listening skills across various settings to engage diverse audiences.

Assessment Strategies

- 1.1. Discussion participation

Criteria

Your performance will be successful when:

- 1.1. you identify the course information.
- 1.2. you identify instructor information.
- 1.3. you identify the course description.
- 1.4. you identify the prerequisites and corequisites.
- 1.5. you identify the textbook requirements.
- 1.6. you explain the required course supplies.
- 1.7. you express the college employability essentials.
- 1.8. you recognize the course competencies.
- 1.9. you identify the course timeline.
- 1.10. you explain the course grading procedures.
- 1.11. you detail the attendance policy.
- 1.12. you describe academic integrity.
- 1.13. you utilize the guidelines for success.
- 1.14. you recognize safety policies.
- 1.15. you identify cleanup policies.
- 1.16. you describe final cleanup expectations.
- 1.17. you identify the cell phone policy.
- 1.18. you describe the location of important school documentation.
- 1.19. you express school-wide policies and expectations.

Learning Objectives

- 1.a. Reference course requirements.

2. Evaluate the welded joints used in manufacturing.

Linked Employability Essentials

Communicate Effectively and Respectfully - Apply appropriate writing, speaking, and listening skills across various settings to engage diverse audiences.

Think Critically and Creatively - Apply independent and rigorous reasoning that leads to informed decisions, innovation and personal empowerment.

Assessment Strategies

- 2.1. Discussion participation
- 2.2. Completion of weld joints classroom activities
- 2.3. Completion of weld joints homework activities
- 2.4. Completion of weld joints online activities

2.5. Completion of weld joints test

Criteria

Your performance will be successful when:

- 2.1. you compare butt, corner, lap, T, and edge joints.
- 2.2. you compare double flanged, single flanged, and scarf joints.
- 2.3. you compare square, single-bevel, double bevel, single-v, double-v, single-f, double-j, single-u, and double-u groove material preparations.
- 2.4. you identify face, joint root, weld root, toes, legs, heat affected zone, admixture, theoretical throat, effective throat, and actual throat of fillet welds.
- 2.5. you identify face, face reinforcement, root, root opening, feather edge, root face dimension, root reinforcement, bevel face, bevel angle, groove angle, toes, admixture, undiluted weld metal, and heat affected zone of groove welds.
- 2.6. you identify the convex and concave side of fillet weld gauges.
- 2.7. you measure flat, concave, and convex fillet welds.

Learning Objectives

- 2.a. Compare material joint configurations.
- 2.b. Compare groove configurations applied to welded joints.
- 2.c. Identify the parts of a fillet weld.
- 2.d. Identify the parts of a groove weld.
- 2.e. Use fillet weld gauges properly.

3. Interpret welding symbols.

Linked Employability Essentials

Communicate Effectively and Respectfully - Apply appropriate writing, speaking, and listening skills across various settings to engage diverse audiences.

Think Critically and Creatively - Apply independent and rigorous reasoning that leads to informed decisions, innovation and personal empowerment.

Assessment Strategies

- 3.1. Discussion participation
- 3.2. Completion of welding symbols classroom activities
- 3.3. Completion of welding symbols homework activities
- 3.4. Completion of welding symbols online activities
- 3.5. Presentation on welding symbols
- 3.6. Completion of welding symbols test

Criteria

Your performance will be successful when:

- 3.1. you interpret the difference between weld symbol and welding symbol.
- 3.2. you construct the reference line, leader, and tail of a welding symbol.
- 3.3. you identify the non-preferred weld symbols for plug, slot, arc seam, arc spot, projection, resistance spot, resistance seam, flash/upset, and field weld symbols.
- 3.4. you explain a welding symbol by stating the weld to be made, the side(s) to weld, size or joint preparation, angle preparation, depth of penetration, finish, and supplemental information.
- 3.5. you draw the fillet, groove, surfacing, plug, slot, spot, seam, projection and edge weld symbols.
- 3.6. you draw weld-all-around, field weld, melt-through, consumable insert, spacer, back, backing, backing bar, flush, convex, and concave supplementary weld symbols.
- 3.7. you draw chipping, grinding, hammering, machining, rolling, and unspecified finishing symbols.
- 3.8. you express the significance of a broken leader line.
- 3.9. you interpret combination weld symbols.
- 3.10. you interpret welding symbols with multiple leader lines.
- 3.11. you interpret welding symbols with multiple reference lines.
- 3.12. you determine weld side, size, length, angle, depth, width, depth of fill, pitch, root opening, quantity, contour, strength, process, finish, projection size, location, extent, orientation, sequence, minimum buildup, and diameter information applied to welding symbols.
- 3.13. you compare intermittent, chain-intermittent, and staggered intermittent weld symbol information.
- 3.14. you investigate removable and permanent backing materials.
- 3.15. you express the use of runoff tabs.
- 3.16. you compare resistance spot, seam, and projection welds to arc spot, seam, and projection welds.

- 3.17. you express the use of surfacing welds.

Learning Objectives

- 3.a. Locate arrow and other side welds.
- 3.b. Identify non-preferred weld symbols.
- 3.c. Explain welding symbols in a systematic manner.
- 3.d. Analyze the nomenclature of fillet welding symbols.
- 3.e. Analyze the nomenclature of groove welding symbols.
- 3.f. Analyze the nomenclature of plug and slot welding symbols.
- 3.g. Analyze the nomenclature of spot, seam, and projection welding symbols.
- 3.h. Analyze the nomenclature of surfacing welding symbols.
- 3.i. Analyze the nomenclature of edge welding symbols.

4. Interpret non-destructive testing symbols.

Linked Employability Essentials

Communicate Effectively and Respectfully - Apply appropriate writing, speaking, and listening skills across various settings to engage diverse audiences.

Think Critically and Creatively - Apply independent and rigorous reasoning that leads to informed decisions, innovation and personal empowerment.

Assessment Strategies

- 4.1. Discussion participation
- 4.2. Completion of non-destructive testing symbols homework activities
- 4.3. Completion of non-destructive testing symbols online activities
- 4.4. Presentation on non-destructive testing symbols
- 4.5. Completion of non-destructive testing symbols test

Criteria

Your performance will be successful when:

- 4.1. you express the importance of quality control.
- 4.2. you identify methods to implement quality control.
- 4.3. you compare the American Welding Society, the American Society of Mechanical Engineers, and the American Petroleum Institute.
- 4.4. you compare guided bend, tensile, and Charpy destructive test methods.
- 4.5. you compare acoustic emissions, electromagnetic, leak, magnetic particle, neutron radiographic, liquid penetrant, proof, radiographic, ultrasonic, and visual non-destructive test methods.
- 4.6. you determine side, quantity, length, orientation, extent, location, radiation direction and specification information applied to non-destructive testing symbols.
- 4.7. you interpret combination examination and weld/examination symbols.

Learning Objectives

- 4.a. Express the purpose of welding codes.
- 4.b. Compare the destructive methods used to qualify welders.
- 4.c. Compare the non-destructive methods used to qualify welders.
- 4.d. Analyze the nomenclature of non-destructive testing symbols.
- 4.e. Interpret the location and extent of non-destructive testing specified on a print.

Course Learning Plans and Performance Assessment Tasks

Course Expectations

Target Competencies

1. Explain course expectations.

Assessment Strategies

- 1.1. Discussion participation

Criteria

Your performance will be successful when:

- 1.1. you identify the course information.
- 1.2. you identify instructor information.
- 1.3. you identify the course description.
- 1.4. you identify the prerequisites and corequisites.
- 1.5. you identify the textbook requirements.
- 1.6. you explain the required course supplies.
- 1.7. you express the college employability essentials.
- 1.8. you recognize the course competencies.
- 1.9. you identify the course timeline.
- 1.10. you explain the course grading procedures.
- 1.11. you detail the attendance policy.
- 1.12. you describe academic integrity.
- 1.13. you utilize the guidelines for success.
- 1.14. you recognize safety policies.
- 1.15. you identify cleanup policies.
- 1.16. you describe final cleanup expectations.
- 1.17. you identify the cell phone policy.
- 1.18. you describe the location of important school documentation.
- 1.19. you express school-wide policies and expectations.

Learning Objectives

- 1.a. Reference course requirements.

Learning Activities

1. Read course syllabus documentation.
2. Participate in classroom discussion on course requirements.

Evaluating the Welded Joints Used in Manufacturing

Target Competencies

1. Evaluate the welded joints used in manufacturing.

Assessment Strategies

- 1.1. Discussion participation
- 1.2. Completion of weld joints classroom activities
- 1.3. Completion of weld joints homework activities
- 1.4. Completion of weld joints online activities
- 1.5. Completion of weld joints test

Criteria

Your performance will be successful when:

- 1.1. you compare butt, corner, lap, T, and edge joints.
- 1.2. you compare double flanged, single flanged, and scarf joints.
- 1.3. you compare square, single-bevel, double bevel, single-v, double-v, single-f, double-j, single-u, and double-u groove material preparations.
- 1.4. you identify face, joint root, weld root, toes, legs, heat affected zone, admixture, theoretical throat, effective throat, and actual throat of fillet welds.
- 1.5. you identify face, face reinforcement, root, root opening, feather edge, root face dimension, root reinforcement, bevel face, bevel angle, groove angle, toes, admixture, undiluted weld metal, and heat affected zone of groove welds.
- 1.6. you identify the convex and concave side of fillet weld gauges.
- 1.7. you measure flat, concave, and convex fillet welds.

Learning Objectives

- 1.a. Compare material joint configurations.
- 1.b. Compare groove configurations applied to welded joints.
- 1.c. Identify the parts of a fillet weld.
- 1.d. Identify the parts of a groove weld.
- 1.e. Use fillet weld gauges properly.

Learning Activities

1. Read weld joints documentation.
2. Participate in weld joints discussion.
3. Complete weld joints classroom activities.
4. Complete weld joints homework activities.
5. Complete weld joints on-line activities.

Interpreting Welding Symbols

Target Competencies

1. Interpret welding symbols.

Assessment Strategies

- 1.1. Discussion participation
- 1.2. Completion of welding symbols classroom activities
- 1.3. Completion of welding symbols homework activities
- 1.4. Completion of welding symbols online activities
- 1.5. Presentation on welding symbols
- 1.6. Completion of welding symbols test

Criteria

Your performance will be successful when:

- 1.1. you interpret the difference between weld symbol and welding symbol.
- 1.2. you construct the reference line, leader, and tail of a welding symbol.
- 1.3. you identify the non-preferred weld symbols for plug, slot, arc seam, arc spot, projection, resistance spot, resistance seam, flash/upset, and field weld symbols.
- 1.4. you explain a welding symbol by stating the weld to be made, the side(s) to weld, size or joint preparation, angle preparation, depth of penetration, finish, and supplemental information.
- 1.5. you draw the fillet, groove, surfacing, plug, slot, spot, seam, projection and edge weld symbols.
- 1.6. you draw weld-all-around, field weld, melt-through, consumable insert, spacer, back, backing, backing bar, flush, convex, and concave supplementary weld symbols.
- 1.7. you draw chipping, grinding, hammering, machining, rolling, and unspecified finishing symbols.
- 1.8. you express the significance of a broken leader line.

- 1.9. you interpret combination weld symbols.
- 1.10. you interpret welding symbols with multiple leader lines.
- 1.11. you interpret welding symbols with multiple reference lines.
- 1.12. you determine weld side, size, length, angle, depth, width, depth of fill, pitch, root opening, quantity, contour, strength, process, finish, projection size, location, extent, orientation, sequence, minimum buildup, and diameter information applied to welding symbols.
- 1.13. you compare intermittent, chain-intermittent, and staggered intermittent weld symbol information.
- 1.14. you investigate removable and permanent backing materials.
- 1.15. you express the use of runoff tabs.
- 1.16. you compare resistance spot, seam, and projection welds to arc spot, seam, and projection welds.
- 1.17. you express the use of surfacing welds.

Learning Objectives

- 1.a. Locate arrow and other side welds.
- 1.b. Identify non-preferred weld symbols.
- 1.c. Explain welding symbols in a systematic manner.
- 1.d. Analyze the nomenclature of fillet welding symbols.
- 1.e. Analyze the nomenclature of groove welding symbols.
- 1.f. Analyze the nomenclature of plug and slot welding symbols.
- 1.g. Analyze the nomenclature of spot, seam, and projection welding symbols.
- 1.h. Analyze the nomenclature of surfacing welding symbols.
- 1.i. Analyze the nomenclature of edge welding symbols.

Learning Activities

- 1. Read welding symbols documentation.
- 2. Watch welding symbols videos.
- 3. Participate in welding symbols discussion.
- 4. Complete welding symbols classroom activities.
- 5. Complete welding symbols homework activities.
- 6. Complete welding symbols online activities.

Interpreting Non-Destructive Testing Symbols

Target Competencies

- 1. Interpret non-destructive testing symbols.

Assessment Strategies

- 1.1. Discussion participation
- 1.2. Completion of non-destructive testing symbols homework activities
- 1.3. Completion of non-destructive testing symbols online activities
- 1.4. Presentation on non-destructive testing symbols
- 1.5. Completion of non-destructive testing symbols test

Criteria

Your performance will be successful when:

- 1.1. you express the importance of quality control.
- 1.2. you identify methods to implement quality control.
- 1.3. you compare the American Welding Society, the American Society of Mechanical Engineers, and the American Petroleum Institute.
- 1.4. you compare guided bend, tensile, and Charpy destructive test methods.
- 1.5. you compare acoustic emissions, electromagnetic, leak, magnetic particle, neutron radiographic, liquid penetrant, proof, radiographic, ultrasonic, and visual non-destructive test methods.

- 1.6. you determine size, quantity, length, orientation, extent, location, radiation direction and specification information applied to non-destructive testing symbols.
- 1.7. you interpret combination examination and weld/examination symbols.

Learning Objectives

- 1.a. Express the purpose of welding codes.
- 1.b. Compare the destructive methods used to qualify welders.
- 1.c. Compare the non-destructive methods used to qualify welders.
- 1.d. Analyze the nomenclature of non-destructive testing symbols.
- 1.e. Interpret the location and extent of non-destructive testing specified on a print.

Learning Activities

1. Read non-destructive testing symbols documentation.
2. Watch non-destructive testing videos.
3. Participate in non-destructive testing symbols discussion.
4. Complete non-destructive testing symbols homework activities.
5. Complete non-destructive testing symbols online activities.

Name of Class:	Weld Symbols		
Catalog/State Course #:	10-621-114		
Instructor Name:	Craig Schmdit	Office:	F194
Email:	schmidt@c@fvtc.edu	Phone:	920-232-6056
Office Hours:	Wednesday 2:00pm – 4:00pm		
Class Number:	WAT109 – WAT111	Credits:	1
Day(s) of Week:	Wednesday	Class Time:	4:00pm – 8:50pm
Start/End Dates:	4/8/2020 – 5/6/2020	Weeks:	5
Location:	Wautoma		
Textbook:	J.R Walker & W.R. Polanin. <i>Welding Print Reading</i> . 6th edition. ISBN 978-1-60525-911-6.		
Supplies Needed:	See Below		

Technical Skills/Equipment Needed

Safety Glasses	Z87+ approved with side shields (prescription safety glasses okay with clip on side shields) are required .
Work Shoes/Boots	Safety toe leather work shoes or boot are required . Tennis shoes are not allowed in the shop.
Gloves	1pr – Leather Work
Tape Measure	10-12ft. is recommended. Look for a ¾” wide blade with 1/32” graduations. Avoid carpenter’s tape measures.
Caliper	6” dial or digital with measurement down to 0.001”
Calculator	Ti-30Xa or equivalent
USB Flash Drive	Any size should work. Look for 2GB or bigger.

Blackboard Support: email - online@fvtc.edu Phone: (920) 735-4816

Communication Policy

My preferred method of communication is in person during my office hours, the secondary method is email. I respond to email messages within 24 hours on Monday through Friday and periodically on weekends.

Grading Policy

All reading assignments, written worksheets, lab assignments, and other class work must be completed if you expect a passing grade. Attending discussions is essential for passing written tests. Your grade is derived from the completion of worksheets, exams, laboratory projects, and classroom and on-line participation.

Exam and lab scores are calculated at the end of the semester to find your course score. Grades for tests, worksheets, other assignments, as well as the course itself are based on percentages. Letter grades are assigned to those percentages based on how well you have achieved the course objectives. At the end of the term, you will receive your individual letter grades and a grade point average (GPA). Your GPA is computed by finding the point value assigned to each letter grade (i.e. A=4.00, A-=3.67, etc). Letter grades are given the following grade point values:

Grading Scale

A = 100 - 95	A- = 94.99 - 92.5
B+ = 92.49 - 90.00	B = 89.99 - 87.5
B- = 87.49 - 85.0	C+ = 84.99 - 82.5
C = 82.49 - 80.0	C- = 79.99 - 77.5
D+ = 77.49 - 75.0	D = 74.99 - 72.5
D- = 72.49 - 70.0	F = <70.00

Breakdown of Grade

All coursework for this class is weighted. That means, regardless of the point value awarded for individual assignments, the entire category an assignment falls into is given more or less grade “weight” as the instructor sees fit. Category weight for this course is as follows:

Work Habits	10%
Participation	10%
Classroom Assignments	40%
Tests	40%
Total	100%

You are responsible for keeping track of your course progress. You can track your grade and progress by checking the Gradebook section in Blackboard. As assignments are completed and graded, your instructor will update your course grade. Nonetheless, you should have the instructor sign and date your copy of lab exercises and assignment sheets. Keep signed copies of assignments until after the course ends to ensure you have proof of completing an assignment if the instructor forgets to enter the grade.

The instructor will be the only one who checks off your progress in Blackboard Gradebook. Under no circumstances shall a student have access to the instructor’s Gradebook program.

If you miss a section discussion, section review, or test review, **it is your responsibility** to make the necessary arrangements to get the missed information. You will not be excused from taking a test because you were absent the previous class period. Your grade at the conclusion of the course will be determined based upon the work you have completed. Any incomplete worksheets, labs, or missed tests **will be factored in**.

Make-up for missed tests must be complete within one (1) week following the missed test. After one (1) week, the test will be scored as a zero (0).

Assignments, labs, and homework not complete by their date due will be recorded as a zero (0).

Circumstances may present themselves which require a student to withdraw from a course. If you must withdraw from this course for any reason, it is in your best interest financially to talk with your instructor regarding the procedure to withdraw. If you do not, there is a chance you may be held liable for course fees even if you stop attending class. If you stop coming to class, that does not mean you are withdrawn, and it is likely you will receive a failing grade at the end of the semester. You are responsible for taking the necessary action to withdraw yourself from the class through a student advisor or the MyFVTC portal.

If situations arise where you need an extension for this course, you must talk with your instructor ahead of time to make accommodations. There are very few circumstances that would warrant a course extension. Your best option is to show up on time, every day, and complete coursework when it is due.

Assignment/Exam Policy

Late work will only be accepted with prior approval from the instructor. Late work may be reduced by one full grade or 10%.

Department/Program Grade Expectations

Work habits are assessed based on your professionalism during the class. A reduction to the work habits grade is at the discretion of the instructor. The severity of the infraction can warrant a reduction of 1-5 points per occurrence. It is important to realize that your work habits in this course can drastically affect your final grade. This includes but is not limited to:

- Showing up to class on time
- Attending class regularly
- Being prepared for class
- Not being disruptive during class or break times
- Using class time and time outside of class effectively
- Contributing to classroom and Blackboard discussions
- Keeping a positive attitude during class time
- Upholding personal integrity and ethical decision making
- Keeping to assignment schedules
- Admitting mistakes
- Performing tasks to the best of abilities

You are responsible to keep track of your course progress. You can track your grade and progress by checking the Gradebook section in Blackboard. As assignments are completed and graded, your instructor will update your course grade. Nonetheless, you should have the instructor sign and date your copy of lab exercises and assignment sheets. Keep signed copies of assignments until after the course ends to ensure you have proof of completing an assignment if the instructor forgets to enter the grade.

The instructor will be the only one who checks off your progress in Blackboard Gradebook. Under no circumstances shall a student have access to the instructor's Gradebook program.

If you miss a section discussion, section review, or test review, **it is your responsibility** to make the necessary arrangements to get the missed information. You will not be excused from taking a test because you were absent the previous class period. Your grade at the conclusion of the course will be determined on what you have completed. Any incomplete worksheets, labs, or missed tests **will be factored into your grade.**

Make-up for missed tests must be complete within one (1) week following the missed test. After one (1) week, the test will be scored as a zero (0).

Assignments, labs, and homework not complete by their date due will be recorded as a zero (0).

Circumstances may present themselves which require a student to withdraw from a course. If you must withdraw from this course for any reason, it is in your best interest financially to talk with your instructor regarding the procedure to withdraw. If you do not, there is a chance you may be held liable for course fees even if you stop attending class. If you stop coming to class, that does not mean you are withdrawn, and you will likely receive a failing grade at the end of the semester. You are responsible for taking the necessary action to withdraw yourself from the class through a student advisor or the MyFVTC portal.

If situations arise where you need an extension for this course, you must talk with your instructor ahead of time to make accommodations. There are very few circumstances that would warrant a course extension. Your best option is to show up on time each day and complete coursework when it is due.

There are 1st semester pre-requisites for 2nd semester courses. You need to pass pre-requisite courses in order to take future courses.

Student Effort: In order to meet the course requirements, you should expect approximately two hours of outside class work for every one hour of effort in the classroom. In lab courses, you can generally expect to spend one hour of outside effort for every two hours in the lab. This will allow you to fully prepare and review necessary course activities.

Online Content Outline and Schedule - 2 Credits

Dates	Topics/Blackboard Location	Work Due	Estimated Effort (hours)
Week 1	Common Joints and Welds	<ul style="list-style-type: none"> • Section Objectives • Section Presentation slides • Section Activities • Section Gamma + • Section Test 	4.7
Week 2	Weld Symbols	<ul style="list-style-type: none"> • Section Objectives • Section Presentation slides • Relevant Section Information • Section Activities • Section Gamma + • Section Test 	4.7
Week 3	Fillet Welds	<ul style="list-style-type: none"> • Section Objectives • Section Presentation slides • Relevant Section Information • YouTube Videos • Section Activities • Section Gamma + • Section Test 	4.7
Week 4	Groove Welds	<ul style="list-style-type: none"> • Section Objectives • Section Presentation slides • YouTube Videos • Section Activities • Section Gamma + • Section Test 	4.7
Week 5	Plug and Slot welds	<ul style="list-style-type: none"> • Section Objectives • Section Presentation slides • YouTube Videos • Section Activities • Section Gamma + 	4.7

		<ul style="list-style-type: none"> • Section Test 	
Week 6	Spot, Seam and Projection welds	<ul style="list-style-type: none"> • Section Objectives • Section Presentation slides • YouTube Videos • Section Activities • Section Gamma + • Section Test 	4.7
Week 7	Surfacing Welds	<ul style="list-style-type: none"> • Section Objectives • Section Presentation slides • YouTube Videos • Section Activities • Section Gamma + • Section Test 	4.7
Week 8	Edge Welds	<ul style="list-style-type: none"> • Section Objectives • Section Presentation slides • Section Activities • Section Gamma + • Section Test 	4.7
Week 9	Nondestructive Testing Symbols	<ul style="list-style-type: none"> • Section Objectives • Section Presentation slides • YouTube Videos • Section Activities • Section Gamma + • Section Test 	4.7

Attendance Policy

To be early is to be on time.

You will need to perform the skills you will learn in this course on the job. You will also be expected to act as though you are on the job any time you are on a FVTC campus.

Participation in classroom and lab activities account for a portion of your grade in this course. If you are tardy or absent, you are not able to participate in classroom or lab activities. This will in turn effect your participation grade.

Classes start **sharply** at their designated time. If a class starts at 12pm, walking through the door at 12 noon and 1 second will render you tardy. We start our class discussions right away. Coming in late disrupts the classroom and causes lost class time.

If you are going to be tardy or absent, you are required to call or e-mail your instructor at least ten (10) minutes prior to class starting.

You are considered **tardy** if you arrive after the start of class.

If you are **tardy** 3 times in any one class, you may receive a failing grade for the class.

If you leave the classroom or lab before you are dismissed, you will be marked as being **tardy**.

If you are tardy for more than 10% of a class, you may receive a failing grade for the class. (72 hour = 7.2 unexcused hours per course).

If you are not present for class, you are considered **absent**.

If you are **absent** due to illness or another reason, you must contact your instructor at least ten (10) minutes before the start of class.

If you know you will be **absent** ahead of time or for an extended period of time, you must get the absence approved by your instructor.

If you are **absent** for 2 or more consecutive days, you are required to bring in a written excuse for the time you missed.

If you have unexcused **absences, tardies**, or a combination of the two totaling more than 10% of a class, you may receive a failing grade for the class. (72 hour = 7.2 unexcused hours per course).

If you are absent and do not call in (**no call/no show**), you will be docked 2 days as if you were absent. If you are **no call/no show** 2 times, you may receive a failing grade for the class.

Of course, there might be extenuating circumstances. These will be evaluated by the instructor on a one-on-one basis. It is your responsibility to inform the instructor of your individual situation.

Student Resources/Support: (*Note: Underlined items are hyperlinks to the FVTC College resources and/or policies.*)

- [Campus Safety & Security](#) - Life threatening 911 / Emergency (920) 735-4777 / Non-emergency (920) 735-5691
- [Support Services](#) - There is a broad network of support services for you at Fox Valley Technical College; see them at this link that takes you to the Help and Resources Tab in Blackboard.
- [Tutoring/Writing Assistance](#) - The Teaching and Learning Center (TLC) and Write Way are services to assist you with tutoring and writing assistance services; see the For Students tab in Blackboard.
- [Course Withdrawal](#) - If you choose to withdraw from the course, please contact me and enrollment services to ensure you are aware of the impact to your Academic and Financial Aid GPAs.
- **Equal Opportunity** - Fox Valley Technical College is committed to ensuring equal access to its educational programs and employment opportunities without regard to sex, gender, race, color, national origin, religion, age, disability, gender identity, sexual orientation, genetic characteristics, marital status, or military status.
 - **ADA** - FVTC provides a wide range of supplemental services to ensure reasonable accommodations to the known physical or mental limitations of qualified individuals with disabilities. To obtain more information or request accommodations, contact FVTC's Student Services' Educational Support Center at (920) 735-5679 Voice/TTY.
 - **Title IX** - FVTC prohibits all forms of illegal gender and sex-based discrimination, which includes acts of sexual violence, sexual harassment, domestic violence, dating violence, and stalking. To report a Title IX concern, contact Security Services at (920) 735-5691 or (920) 993-5177. [Sexual Misconduct Policy](#)

Student Conduct

- [Academic and General Codes of Conduct](#) - Please review this document to understand your rights and responsibilities as a student

- Plagiarism and Academic Conduct - Plagiarism and Academic Conduct - Fox Valley Technical College prohibits all forms of academic dishonesty. Violations are subject to the college conduct process. See the student handbook for more information.
- [Acceptable Use of Computers and Electronic Devices](#)

Student Expectations

When students enter college, they take upon themselves certain responsibilities and obligations, including satisfactory academic performance and social behavior consistent with the lawful purposes of the college. Student conduct, therefore, is not considered in isolation within the college community but as an integral part of the education process. All students are expected to know and abide by this code of student conduct. Any student found to have committed or to have attempted to commit misconduct is subject to disciplinary sanctions.

The Student Code of Conduct is available in the Student Handbook and through the Student Life office and details sanctions, appeal process, and procedures if a student violates this code.

Be prepared to work when you show up for class, and be sure you have all the needed equipment. If you do not have your equipment, you may be sent home and marked as **tardy** or **absent**. This includes but not limited to; writing utensils, books, safety supplies, proper work clothing, etc.

When someone is speaking, listen with respect. Do not talk when you are supposed to be listening.

Participate in discussions. You will learn more, and participation is a portion of your grade.

Always be patient with yourself and others. If you must leave the room, leave quietly.

Disruptive behavior during classroom discussions or activities will not be tolerated. Any student deemed disruptive by the instructor will be asked to leave for the duration of the period and marked absent. Ongoing disruptive behavior will result in disciplinary action.

No food will be allowed in the classroom at any time. Only drinks with a **sealable cap** are allowed in the classroom and shop. No fast food cups or coffee mugs are allowed if the lid can easily come off. If you spill your drink, it is your responsibility to clean it up.

Cheating, lying, or stealing will be grounds for immediate failure from the course and dismissal from the program.

This includes:

- Welding, chipping, brushing, and grinding in a position other than the assigned welding position
- Turning in work completed by another student
- Copying another student's test, exam, or assignment
- Copying files from another student and turning them in as one's own work

Work only on the projects for the course. Extra projects may be allowed from time to time, but only with the approval of your instructor. Do not assume you can make trailers, tree stands, car parts, etc.

You are expected to keep your lab/theory manual in an organized manner at all times, because if it is neat and in order you can find information faster. Inability to participate in classroom or lab discussions because of disorganization will result in a reduced participation grade for each occurrence.

Loud or rude language in the hallways will be grounds for dismissal from the day's activities and will affect your participation grade. There are other classes and offices being used while you attend school, so it is important to be courteous to others.

FVTC campuses and grounds are non-tobacco facilities. Per FVTC policy, smoking or chew will only be allowed **inside** your vehicle. Butts are to be disposed of in your vehicle, not on the ground outside the building or parking lot.

Garbage shall also be disposed of properly. Do not throw trash on the ground outside the building. Clean up your mess in the classroom. If you leave behind trash, you will be docked participation points.

Guidelines for Success

Accommodations for Persons with Disabilities - Reasonable accommodations for persons with disabilities will be made to ensure access to academic programs, activities, services, and employment in accordance with 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 standards. If you need accommodations, contact your campus Disabilities Specialist.

Scholarships - Scholarship information can be found at <http://www.fvtc.edu/community-alumni/foundation-alumni/scholarships>

Advisement - Students may have academic advisors assigned to them to assist them in academic issues such as determining appropriate classes, sequencing of courses for degree completion, and registration activities. Students can find their Academic Advisor through MyFVTC or by contacting Student Services.

Safety Policies

Lab and Classroom Safety Faculty members will go over safety rules during the first week of classes. Safety precautions should be observed at all times. Shoes and shirts are required at all times in college buildings. Rules and regulations are made for the well-being of all students.

General Safety

1. You are responsible for the purchase and maintenance of your safety supplies. If you show up to class without these supplies, you will not be allowed to participate in lab activities and will be marked **tardy** or **absent**.
2. Horseplay or any intentional unsafe behaviors will result in disciplinary action up to and including removal from the program and receiving F grades for all courses.
3. Fighting or threatening students, peers, instructors, or other FVTC staff will not be tolerated and will result in disciplinary action up to and including removal from the program and receiving failing grades for all courses.
4. Do not run.
5. Equipment must be returned to its proper place immediately after use.
6. Only authorized personnel should use tools and equipment.
7. Do not operate equipment without the faculty member's permission.
8. If machinery is faulty, call it to the attention of the faculty member immediately.

9. Toxic material bulletins must be observed. In the event of a toxic material spill, report it immediately to your faculty member.
10. If anything is spilled on the floor, proper procedures must be followed. If safe, clean it up immediately.
11. Always use proper equipment and protective clothing for the task you are performing.
12. Propane lighters are not allowed in lab areas.

Cleanup Policy

Cleanup is essential for a safe and productive work environment. As mentioned before, you will be counted as **tardy** or **absent** and points taken away from your participation grade if you do not join in cleanup. Cleanup includes, but is not limited to, the following **every day**:

- Welders turned off, gases shut off, and cords wrapped up in correct location
- Booth and student tools returned to their proper place
- Electrodes and metal (new and used) put in their proper location
- Used electrodes and metal thrown in the appropriate dumpsters.
- Booth table tops ground off at the end of **each** class period
- Booth and breezeways swept
- Grinding and cutting rooms swept
- Metal picked up and put away from behind the shear
- Chips and metal cleaned up on both saws
- Ironworker metal cleaned up
- Tabletops cleaned off and tools put away
- Floor swept in fabrication lab
- Everything has a place. If something is out of place, put it where it belongs. If you don't know where it belongs, ask an instructor.

Cell Phone Policy

Cell phones may be used in public areas. Cell phone misuse constitutes a breach of code of conduct and may result in disciplinary action.

Please respect the intent of the learning environment and your fellow classmates by turning cell phones off when in class or the library. Receiving calls or texting during class time (discussion or lab) will result in a reduced participation grade for each occurrence.

If you must have your cell phone on for emergency purposes, inform your instructor.

Cell phones are not allowed for activities or tests that require a calculator.

Student Handbook Link

Above and beyond the course rules and policies listed above, students must also adhere to rules and policies set forth by FVTC. A link to those policies can be found below or by referencing the student handbook.

<http://www.fvtc.edu/myfvtc/student-forms-policies>

Course Description

Teaches students to interpret detailed weld symbols using the American Welding Society standard.

Prerequisites

None

Course Competencies: All students should be competent in the following knowledge, skills, and behaviors by the end of this course.

- Explain joints used in manufacturing and the welds applied to join them.
- Translate all aspects of a welding symbol.
- Interpret weld information specific to fillet welding symbols.
- Interpret weld information specific to groove welding symbols.
- Interpret weld information specific to plug and slot welding symbols.
- Interpret weld information specific to spot, seam, and projection welding symbols.
- Interpret weld information specific to surfacing welding symbols.
- Interpret weld information specific to edge welding symbols.
- Translate all aspects of a nondestructive testing symbol.

Employability Essentials: FVTC works closely with area employers to ensure our students are learning the skills needed in today's competitive workplace. In addition to technical skills, you will also learn and practice the following Employability Essentials—the skills and behaviors employers want in the workplace.

- Adapt to Change
- Think Critically and Creatively
- Work Collaboratively
- Communicate Effectively and Respectfully
- Act Responsibility

Amendment to Syllabus

Any changes to the information in the syllabus affecting the course, or course content will be announced by the instructor. Changes to the course policies may occur due to extenuating circumstances.

Addendum