

Grade 11A Basic Metal Design Fabrication and Oxy-Acetylene Procedures (30S)

Course Code: 8414

Credit: 1.0 Credit

Program: Senior Years Technology Education Program (SYTEP)

School: Swan Valley Regional Secondary School

Program Cluster: Welding Technology

Course Length: Approximately 110 instructional hours (one semester)

Instructor: Mr. Jeremy Hicks

Course Description

Basic Metal Design Fabrication and Oxy-Acetylene Procedures (30S) develops the planning, layout, cutting, fitting, and fabrication skills required in the welding trade.

Students interpret basic drawings and welding symbols, apply trade mathematics, safely operate oxy-fuel equipment, and use appropriate tools and processes to prepare and assemble metal components. Emphasis is placed on accurate work, safe cylinder handling, thermal cutting, oxy-acetylene procedures, and quality fabrication.

Instruction reflects the updated Manitoba curriculum and Apprenticeship Manitoba Level 1 outcomes related to drawings, weld inspection, thermal cutting, layout, and fabrication.

Course Goals

Upon successful completion of this course, students will:

- Demonstrate safe work practices for fabrication, oxy-fuel equipment, tools, and materials.
- Interpret basic shop drawings, dimensions, line types, and welding symbols.
- Apply metric and imperial measurement, conversions, geometry, and material calculations.
- Prepare accurate layouts, templates, cut lists, and material plans.
- Set up, inspect, operate, and shut down oxy-acetylene equipment safely.
- Perform thermal cutting, heating, and introductory oxy-acetylene joining procedures.
- Fit, tack, assemble, control distortion, and finish fabricated components.

- Inspect completed work for dimensional accuracy, weld quality, and craftsmanship.

Course Content

Trade Safety and Oxy-Fuel Equipment (10 Hours)

Students review PPE, WHMIS, hot-work hazards, fire prevention, ventilation, cylinder identification and handling, regulators, hoses, flashback protection, leak testing, equipment inspection, and emergency shutdown procedures.

Drawings and Welding Symbols (12 Hours)

Students interpret orthographic and pictorial drawings, dimensions, tolerances, line types, bills of materials, joint details, and introductory welding symbols used in fabrication.

Trade Mathematics and Material Planning (10 Hours)

Students apply fractions, decimals, metric and imperial conversions, perimeter, area, angles, basic geometry, and material allowances to produce cut lists and estimate material requirements.

Measuring, Layout and Templates (12 Hours)

Students use rules, squares, dividers, levels, punches, soapstone, and templates to lay out straight, angled, and shaped components accurately.

Oxy-Fuel Cutting and Gouging (16 Hours)

Students select tips and pressures, adjust a neutral flame, pierce material, make straight and shaped cuts, bevel edges, and recognize and correct common cutting defects. Gouging concepts and applications are introduced.

Oxy-Acetylene Welding, Brazing and Heating (18 Hours)

Students safely light, adjust, and shut down equipment; identify flame types; control the puddle; and complete basic fusion-welding, brazing, and heating activities as suitable for the available equipment and project.

Joint Preparation, Fit-Up and Assembly (10 Hours)

Students prepare edges and surfaces, select joints, establish root openings where required, use clamps and fixtures, tack components, check alignment, and apply basic distortion-control methods.

Fabrication Project (18 Hours)

Students plan and construct a metal project from drawings or an approved design, applying layout, cutting, fitting, assembly, welding, grinding, and finishing skills while managing materials and time responsibly.

Quality Inspection and Final Assessment (4 Hours)

Students verify dimensions, inspect cut and weld quality, identify surface discontinuities, correct deficiencies where appropriate, and evaluate the finished product against project criteria.

Assessment

Student achievement will be evaluated using the following categories:

- **Classwork:** 20%
- **Practical Skill Demonstrations:** 30%
- **Tests and Quizzes:** 30%
- **Projects:** 20%

Assessment emphasizes both theoretical knowledge and practical skill development. Students are expected to demonstrate safe work habits, active participation, improving technical skill, and quality workmanship throughout the course.

Required Personal Protective Equipment

Students are required to wear appropriate PPE during all shop activities. If a student does not have the following PPE, it will be provided to them.

- CSA-approved steel-toe boots or toe caps
- Safety glasses
- Hearing protection
- Welding gloves
- Appropriate protective clothing and welding helmet as required

Students who do not wear the required PPE may not be permitted to participate in shop activities.

Student Expectations

Students are expected to:

- Attend class regularly and arrive on time.
- Follow all shop safety rules, safe work procedures, and teacher instructions.
- Wear required PPE before entering the shop.
- Respect classmates, instructors, equipment, materials, and facilities.
- Maintain a clean and organized work area.
- Participate fully in classroom and shop activities.
- Demonstrate responsibility, teamwork, communication, and professionalism.
- Complete assignments, weld samples, tests, and projects to the best of their ability.

Unsafe behavior may result in removal from shop activities until safety expectations have been met.

Cell Phone Policy

To maintain a safe and focused learning environment, students are required to place their cell phones in the classroom phone lockbox at the beginning of each class. Phones will remain securely stored for the duration of the class and will be returned at the end of the class period.

Students do not require personal cell phones during Welding Technology. School-issued laptops and classroom resources will be provided for online learning, research, quizzes, drawings, documentation, or other educational tasks.

This policy minimizes distractions, promotes engagement, and supports a safe working environment in the welding shop.

Curriculum Alignment

This course addresses learning outcomes from the updated Manitoba Grade 11A Basic Metal Design Fabrication and Oxy-Acetylene Procedures curriculum and is aligned with selected Apprenticeship Manitoba Level 1 technical-training outcomes.

Primary Apprenticeship Manitoba units addressed include:

- A7 Drawings and Welding Symbols
- A8 Weld Process and Quality Inspection I
- A9 Thermal Cutting and Gouging
- A10 Layout and Fabrication I

Supporting outcomes related to trade safety, career education, trade communication, trade mathematics, tools and equipment, materials and consumables, and workplace professionalism are integrated throughout the course.