Course Name: Welding Technology I

Unit 1 - Introduction to Welding

Essential Questions (from learning targets)	Content Area	Skills / Learning Priority	Standards	Common Assessments
Do you recognize general welding processes? Do you know and understand the welding safety hazards and the appropriate precautions practiced to minimize their dangers?	MNF/Manufacturing	MNF1.a.7.h: Identify safety and health protections and procedures that are critical to worker well-being. MNF1.a.8.h: Use appropriate tools, materials, and machines to repair a malfunctioning system. MNF.1.b.5.h: Apply methodical problem-solving models which include input, process, outcome and feedback components. MNF1.c.6.h: Learn how to cooperate with others in ways to exhibit respect for individual and cultural differences and for the attitudes and feelings of others. MNF1.c.7.h: Recognize characteristics and benefits of teamwork, leadership and citizenship in the school, community and manufacturing settings. MNF1.c.8.h: Participate in the student organization SkillsUSA competitive career development events to enrich academic skills, encourage career choices and contribute to employability. MNF1.f.7.h: Recognize servicing keeps products in good operating condition. MNF1.g.9.h: Identify different types of welding machines. MNF1.g.11.h: Demonstrate safety and chose the proper safety equipment given the process being used (i.e. oxy-acetylene, GMAW, SMAW, GTAW, etc.).	Standard: MNF1: Students will be able to select and use manufacturing technologies.	

Unit Vocabulary

- Welding, shielded metal-arc welding, gas metal-arc welding, gas tungsten-arc welding, oxyacetylene welding, plasma-arc cutting, voltage, current, amperage, resistance, ohm, psi, psig, regulator, fusible plug, bursting disc, flash burn, Class A fire, Class B fire, Class C fire, Class D fire

Resources
Textbook: Welding Skills, R.T. Miller
DVD/Videotapes: Bergwall Productions - #1 Personal Safety and Protection, #2 Safe Use of Equipment, #3 Operator and Fire Safety, #4 Cylinder Safety

Unit 2 - Oxyacetylene Welding

Essential Questions (from learning targets)	Content Area	Skills / Learning Priority	Standards	Common Assessments
Can you identify the characteristics of acetylene and oxygen and their functions in the Oxyacetylene welding (OAW) process? Can you recognize the safety equipment specific to OAW? Can you recognize the components and distinguishing features of acetylene and oxygen cylinders? Can you safely and correctly light an oxyacetylene torch? Can you produce acceptable welds in the flat position on the following weld joints: FJEW, BJGW, OCJGW, LJFW, and TJFW?	MNF/Manufacturing	MNF1.a.7.h: Identify safety and health protections and procedures that are critical to worker well-being. MNF1.a.8.h: Use appropriate tools, materials, and machines to repair a malfunctioning system. MNF.1.b.5.h: Apply methodical problem-solving models which include input, process, outcome and feedback components. MNF1.c.6.h: Learn how to cooperate with others in ways to exhibit respect for individual and cultural differences and for the attitudes and feelings of others. MNF1.c.7.h: Recognize characteristics and benefits of teamwork, leadership and citizenship in the school, community and manufacturing settings. MNF1.c.8.h: Participate in the student organization SkillsUSA competitive career development events to enrich academic skills, encourage career choices and contribute to employability. MNF1.f.7.h: Recognize servicing keeps products in good operating condition. MNF1.g.9.h: Identify different types of welding machines. MNF1.g.11.h: Demonstrate safety and chose the proper safety equipment given the process being used (i.e. oxy-acetylene, GMAW, SMAW, GTAW, etc.). MNF1.g.12.h: Identify different types of welding joints and be able to demonstrate the ability perform the welds (i.e. butt, corner, edge, lap, tee). MNF1.g.13.h: Identify the different type of welding positions and be able to demonstrate the ability to perform the welds (i.e., flat, horizontal, vertical and overhead).	Standard: MNF1: Students will be able to select and use manufacturing technologies.	

Unit Vocabulary

- acetylene, safety nut, bursting disc, valve handwheel, psi, psig, injector torch, equal pressure torch, welding tip, orifice, tip size, regulator, single-stage regulator, two-stage regulator, shade, methylacetylene propadiene (MAPP), flashback, backfire, flashback arrestor, reverse flow valve, purge, neutral flame, carburizing flame, oxidizing flame, reducing flame, forehand welding, backhand welding, filler rod, tack weld, butt joint, lap joint, corner joint, flange joint, tee-joint, fillet weld groove weld

Resources
Textbook: Welding Skills, R.T. Miller
DVD/Videotapes: Oxy-Acetylene Welding, Wall Mountain Company
Equipment/Materials: Oxyacetylene welding station (acetylene cylinder, oxygen cylinder, welding torch, various welding tips, spark lighter, regulators, welding goggles, welding gloves, filler rod, practice steel)

Unit 3 - Shielded Metal-Arc Welding

Essential Questions (from learning targets)	Content Area	Skills / Learning Priority	Standards	Common Assessments
Do you know the electrical vocabulary related to shielded metal-arc welding (SMAW)? Can you recognize safety equipment used in SMAW? Can you identify the differences and similarities between different SMAW electrodes? Can you produce an acceptable bead with the following electrodes: 6013, 6010, 7014, and 7018?	MNF/Manufacturing	MNF1.a.7.h: Identify safety and health protections and procedures that are critical to worker well-being. MNF1.a.8.h: Use appropriate tools, materials, and machines to repair a malfunctioning system. MNF.1.b.5.h: Apply methodical problem-solving models which include input, process, outcome and feedback components. MNF1.c.6.h: Learn how to cooperate with others in ways to exhibit respect for individual and cultural differences and for the attitudes and feelings of others. MNF1.c.7.h: Recognize characteristics and benefits of teamwork, leadership and citizenship in the school, community and manufacturing settings. MNF1.c.8.h: Participate in the student organization SkillsUSA competitive career development events to enrich academic skills, encourage career choices and contribute to employability. MNF1.f.7.h: Recognize servicing keeps products in good operating condition. MNF1.g.9.h: Identify different types of welding machines. MNF1.g.11.h: Demonstrate safety and chose the proper safety equipment given the process being used (i.e. oxy-acetylene, GMAW, SMAW, GTAW, etc.). MNF1.g.12.h: Identify different types of welding joints and be able to demonstrate the ability perform the welds (i.e. butt, corner, edge, lap, tee). MNF1.g.13.h: Identify the different type of welding positions and be able to demonstrate the ability to perform the welds (i.e. flat, horizontal, vertical and overhead).	Standard: MNF1: Students will be able to select and use manufacturing technologies.	

Unit Vocabulary

- shielded-metal arc welding, electrode, electrode holder, work lead, ground lead, voltage, current, amperage, resistance, ohm, alternating current, direct current, direct current straight polarity (DCSP), direct current reverse polarity (DCRP), direct current electrode negative (DCEN), direct current electrode positive (DCEP), conductor, electrical circuit, static electricity, dynamic electricity, open-circuit voltage, duty cycle, constant current, constant voltage, volt-amp curve, transformer, rectifier, generator, flux, arc length, arc gap, electrode angle, electrode classification number, stringer bead, weld crater, weld spatter, undercut, overlap, slag

Resources
Textbook: Welding Skills, R.T. Miller
DVD/Videotapes: Arc Welding I, Wall Mountain Company
Equipment/Materials: Shielded Metal Arc Welding welding station (welding machine, welding cables, welding helmet, welding gloves, scratch brush, bench brush, chipping hammer, various SMAW electrodes)

Unit 4 - Gas Shielded-Arc Welding

Essential Questions (from learning targets)	Content Area	Skills / Learning Priority	Standards	Common Assessments
Can you demonstrate the correct assembly of a gas metal-arc welding (GMAW)/gas tungsten-arc welding (GTAW) torch/gun? Can you correctly setup the GTAW/GMAW machine to produce acceptable welds? Can you produce a bead/BJGW on mild steel in the flat position utilizing a GTAW machine? Can you produce a bead/BJGW on mild steel in the flat position utilizing a GMAW machine?	MNF/Manufacturing	MNF1.a.7.h: Identify safety and health protections and procedures that are critical to worker well-being. MNF1.a.8.h: Use appropriate tools, materials, and machines to repair a malfunctioning system. MNF.1.b.5.h: Apply methodical problem-solving models which include input, process, outcome and feedback components. MNF1.c.6.h: Learn how to cooperate with others in ways to exhibit respect for individual and cultural differences and for the attitudes and feelings of others. MNF1.c.7.h: Recognize characteristics and benefits of teamwork, leadership and citizenship in the school, community and manufacturing settings. MNF1.c.8.h: Participate in the student organization SkillsUSA competitive career development events to enrich academic skills, encourage career choices and contribute to employability. MNF1.f.7.h: Recognize servicing keeps products in good operating condition. MNF1.g.9.h: Identify different types of welding machines. MNF1.g.11.h: Demonstrate safety and chose the proper safety equipment given the process being used (i.e. oxy-acetylene, GMAW, SMAW, GTAW, etc.). MNF1.g.12.h: Identify different types of welding joints and be able to demonstrate the ability perform the welds (i.e. butt, corner, edge, lap, tee). MNF1.g.13.h: Identify the different type of welding positions and be able to demonstrate the ability to perform the welds (i.e. flat, horizontal, vertical and overhead).	Standard: MNF1: Students will be able to select and use manufacturing technologies.	

Unit Vocabulary

- gas metal-arc welding (GMAW), gas tungsten-arc welding (GTAW), metal inert gas welding (MIG), tungsten inert gas welding (TIG), alternating current high frequency (ACHF), direct current electrode negative (DCEN), direct current electrode positive (DCEP), collet, collet body, gas nozzle, end cap, flowmeter, pure tungsten electrode, thoriated tungsten electrode, post purge, post flow, air cooled torch, water cooled torch, upslope, downslope, short-circuit transfer, contact tip, contact tube, gas nozzle, gas diffuser, adapter, liner, shielding gas, inch switch, jog switch, purge

Resources:
Textbook: Welding Skills, R.T. Miller
DVD/Videotapes:
Equipment/Materials: Gas Tungsten Arc Welding station (welding machine, GTAW torch, consumables, foot control, shielding gas, shielding gas regulator, welding helmet, welding gloves) and Gas Metal Arc Welding station (welding machine, GMAW gun, consumables, shielding gas, shielding gas regulator, welding helmet, welding gloves)

Unit 5 - Oxyfuel and Plasma-Arc Cutting

Essential Questions (from learning targets)	Content Area	Skills / Learning Priority	Standards	Common Assessments
Can you demonstrate the correct procedure to light and adjust an oxyfuel cutting outfit? Can you perform a cut utilizing the oxyfuel cutting process? Can you perform a cut utilizing the manual plasma-arc cutting machine?	MNF/Manufacturing	MNF1.a.7.h: Identify safety and health protections and procedures that are critical to worker well-being. MNF1.a.8.h: Use appropriate tools, materials, and machines to repair a malfunctioning system. MNF.1.b.5.h: Apply methodical problem-solving models which include input, process, outcome and feedback components. MNF1.c.6.h: Learn how to cooperate with others in ways to exhibit respect for individual and cultural differences and for the attitudes and feelings of others. MNF1.c.7.h: Recognize characteristics and benefits of teamwork, leadership and citizenship in the school, community and manufacturing settings. MNF1.c.8.h: Participate in the student organization SkillsUSA competitive career development events to enrich academic skills, encourage career choices and contribute to employability. MNF1.f.7.h: Recognize servicing keeps products in good operating condition. MNF1.g.11.h: Demonstrate safety and chose the proper safety equipment given the process being used (i.e. oxy-acetylene, GMAW, SMAW, GTAW, etc.). MNF1.h.6.h: Demonstrate the proper use and proper way to set-up and close down oxy-acetylene equipment and check for leaking gases. MNF1.h.7.h: Demonstrate the proper safety and use with plasma cutting equipment. MNF1.h.8.h: Demonstrate how to use oxy-acetylene and plasma cutting. MNF1.h.9.h: Compare the pros and cons with plasma cutting and oxy-acetylene cutting manufacturing operations and analyze other cutting operations used in industry.	Standard: MNF1: Students will be able to select and use manufacturing technologies.	

Unit Vocabulary

- flame cutting, oxidation, plasma, cutting torch, cutting attachment, psi, psig, orifice, neutral flame, slag, iron oxide

Resources
Textbook: Welding Skills, R.T. Miller
DVD/Videotapes: Torch Cutting, Wall Mountain Company
Equipment/Materials: Oxyfuel Cutting station (acetylene cylinder, flamex cylinder, oxygen cylinder, torch body, cutting attachment, cutting torch, cutting tips, spark lighter, welding goggles, welding gloves) and Plasma Arc Cutting station (PAC machine, manual cutting torch, consumables, welding goggles, welding gloves)