**Charles Spencer High School Industrial Education**

**Teacher: Mr. Del Sheehan- B.Ed., M.Ed.**

**Course Outline: MetalCraft 20**

**85 MINUTE BLOCKS/ QUARTER SYSTEM**

**Introduction:**

• The class will give students an opportunity to receive a minimum of three credits per quarter; some will exceed this depending on motivation and work ethic. The individual modules that will consist of the basic programming will include:

a) FAB1010: FABRICATION TOOLS & MATERIALS

b) FAB1050: BASIC ELECTRIC WELDING

c) FAB1100: FABRICATION PRINCIPLES

d) Additional modules based on student performance, attitude, and readiness.

* Students will be instructed in practical and theoretical safe work practices prior to the completion of modules and will demonstrate this in the form of written quizzes, work place hazard identifications, and in-class practical demonstrations of safe work practice, tool use, and understanding of course content.
* Students will/may cover content as per the outlines that follow each prescribed module from Alberta Education-CTS: <http://www.education.alberta.ca/teachers/program/cts/program-of-studies/tmt/>
* **Safety is a primary component of any industrial arts class; transgressions by students of safe work practices may result in removal from a class.**

**Student Evaluation:**

Assignments, Quizzes and Tests………………….. 20%

Safety ……………….………………………………………… 20%

Skill Application…………………………………………… 30%

Major Project……………………………………………… 30%

Major project, in my understanding, is an opportunity for a student to display skills acquired in a holistic, personally meaningful, and academically challenging manner. It will be open-ended in nature, design, and the assessment is as much CONVERSATION in nature between student and teacher that will be translated into a percentage based on things like degree of difficulty, innovation, quality of workmanship, and practical and theoretical application of curriculum, teacher critique, and student reflection regarding the process and finished project.

**COURSE FAB1010: FABRICATION TOOLS & MATERIALS**

Level: Introductory Prerequisite: None

Description: Students develop knowledge and skills in the use of basic hand tools and materials used in fabrication processes, and safely transform common metals into useful products. Parameters: Access to a materials work centre, complete with basic hand tools. Outcomes: The student will: 1. create a health and safety plan with special emphasis on conditions and factors related to the specific pathway or series of courses 1.1 research and identify the following eight common elements of a health and safety management system: 1.1.1 management, leadership and organizational commitment including policies, guidelines and responsibilities 1.1.2 hazard identification and assessment 1.1.3 hazard control 1.1.4 worker competency and training including: technical competence, safe work practices and procedures, personal protective equipment 1.1.5 work site inspection 1.1.6 incident investigation 1.1.7 emergency response 1.1.8 management system administration including: evaluation, records and statistics, maintenance of system 1.2 explain each of the elements reflecting on occupational health and safety implications 1.3 define health and safety elements relevant to the world-of-work 1.4 present a health and safety plan clarifying its relevance to the work world and society in general 2. research common processes and methods of hazard identification, assessment and control specific to the pathway or series of courses 2.1 research and identify common job site hazard identification processes 2.2 research and identify common methods for assessment and control of hazards 2.3 explain and demonstrate appropriate health and safety effective practices 2.4 demonstrate a proactive personal commitment toward improvement of workplace health and safety including concern for others and following instructions, rules and guidelines 3. identify and describe the safe use of basic hand tools used in fabricating an artifact or structure 3.1 identify and describe basic hand tools that are used to measure, mark, hold, cut, form, fasten and finish materials 3.2 identify and describe basic tools and equipment used in one or more fabrication processes; e.g., welding, bar, tubular and sheet fabrication, foundry operations, machining 2 / CTS, TMT: FAB1010 Introductory 2009 © Alberta Education, Alberta, Canada 4. identify and compare the properties of common ferrous and non-ferrous metals used in fabrication processes 4.1 identify and compare the properties of a variety of ferrous and non-ferrous metals used in fabrication processes 4.2 identify common shapes, sizes and forms of fabrication materials 5. apply fabrication processes and skills in a safe manner to produce a useful product 5.1 describe appropriate methods to handle, recycle, store and dispose of materials 5.2 identify and demonstrate the appropriate use of personal protective equipment 5.3 identify steps to be taken in the event of an accident 5.4 outline the typical phases in a production system including: 5.4.1 planning 5.4.2 fabricating 5.4.3 assembling 5.4.4 finishing 5.4.5 evaluating 5.5 select or modify a plan for a simple product that will meet a defined need 5.6 identify and select the appropriate tools, materials and processes required to make the product 5.7 list the steps that are required to make a product in a safe and logical order 5.8 develop basic fabrication skills by building, assembling and finishing a variety of products 5.9 describe ways to improve product quality and productivity 6. demonstrate basic competencies 6.1 demonstrate fundamental skills to: 6.1.1 communicate 6.1.2 manage information 6.1.3 use numbers 6.1.4 think and solve problems 6.2 demonstrate personal management skills to: 6.2.1 demonstrate positive attitudes and behaviours 6.2.2 be responsible 6.2.3 be adaptable 6.2.4 learn continuously 6.2.5 work safely 6.3 demonstrate teamwork skills to: 6.3.1 work with others 6.3.2 participate in projects and tasks 7. make personal connections to the cluster content and processes to inform possible pathway choices 7.1 complete/update a personal inventory; e.g., interests, values, beliefs, resources, prior learning and experiences 7.2 create a connection between a personal inventory and occupational choices.

**COURSE FAB1050: BASIC ELECTRIC WELDING**

Level: Introductory

Prerequisite: FAB1010: Fabrication Tools & Materials Description: Students develop basic skills related to the safe use and operation of one or more common electric welding processes. Parameters: Access to a materials work centre, complete with electric welding equipment and fabrication facilities, and to instruction from an individual with formal, specialized training in basic Gas Metal Arc Welding (GMAW) and/or Shielded Metal Arc Welding (SMAW). Outcomes: The student will: 1. take preventive measures to avoid accidents and personal injury to self and others by identifying health and safety hazards associated with electric welding processes 1.1 identify and describe the following common electric welding processes and approved abbreviations: 1.1.1 GMAW 1.1.2 Gas Tungsten Arc Welding (GTAW) 1.1.3 SMAW 1.2 describe the hazards associated with GMAW and SMAW 1.3 demonstrate how personal protective equipment is used to protect eyes, skin and respiratory system 1.4 describe a safety plan in case of an accident 1.5 describe the need to remove or protect all combustible materials in the welding area 1.6 identify and locate the appropriate fire extinguisher and fire blanket 2. perform safe GMAW and/or SMAW start-up and shut-down procedures 2.1 describe from a weld specification the: 2.1.1 type of equipment to be used 2.1.2 size and type of electrode/wire 2.1.3 weld settings 2.1.4 type of weld, joint and weld position 2.1.5 weld dimensions 2.2 describe the start-up and shut-down procedures for a given piece of equipment 2.3 locate all pertinent safety equipment and clamping apparatus 3. demonstrate basic arc welding competencies 3.1 describe how an arc is produced and controlled in GMAW and/or SMAW 3.2 explain the purpose of the electrode coating and/or shielding gas in their respective processes 3.3 identify the essential components and accessories used in GMAW and/or SMAW 3.4 identify typical weld types including: 3.4.1 fillet 3.4.2 groove 3.4.3 plug or slot 3.4.4 surfacing 2 / CTS, TMT: FAB1050 Introductory 2009 © Alberta Education, Alberta, Canada 3.5 identify typical weld positions including: 3.5.1 flat 3.5.2 horizontal 3.5.3 vertical 3.5.4 overhead 3.6 list and describe the following basic weld joints: 3.6.1 butt 3.6.2 lap 3.6.3 tee 3.6.4 corner 3.6.5 edge 3.7 prepare weld surfaces by removing any: 3.7.1 oil and/or grease 3.7.2 paint, rust or scale 3.8 demonstrate basic skills in: 3.8.1 selecting equipment and accessories 3.8.2 setting machine parameters 3.8.3 connecting work leads 3.8.4 striking an arc using a tapping and scratching technique 3.8.5 running a stringer and weave bead 3.8.6 performing fillet welds in the flat position using SMAW and GMAW processes 3.9 complete a visual inspection of a weld by considering the overall appearance, size and shape of the bead 4. demonstrate basic competencies 4.1 demonstrate fundamental skills to: 4.1.1 communicate 4.1.2 manage information 4.1.3 use numbers 4.1.4 think and solve problems 4.2 demonstrate personal management skills to: 4.2.1 demonstrate positive attitudes and behaviours 4.2.2 be responsible 4.2.3 be adaptable 4.2.4 learn continuously 4.2.5 work safely 4.3 demonstrate teamwork skills to: 4.3.1 work with others 4.3.2 participate in projects and tasks 5. make personal connections to the cluster content and processes to inform possible pathway choices 5.1 complete/update a personal inventory; e.g., interests, values, beliefs, resources, prior learning and experiences 5.2 create a connection between a personal inventory and occupational choices.

**COURSE FAB1100: FABRICATION PRINCIPLES**

Level: Introductory

Prerequisite: FAB1010: Fabrication Tools & Materials

Description: Students investigate and apply fundamental principles of fabrication to build an artifact or structure from common structural materials. Parameters: Access to a materials work centre, complete with basic hand tools. Outcomes: The student will: 1. identify and describe the principles of separating, forming and combining materials 1.1 list and describe three distinct ways of changing the shape of a material; e.g., separating, forming, combining (joining) 1.2 describe and give examples of tools that: 1.2.1 shear 1.2.2 chip 1.2.3 abrade 1.3 identify other current and emerging processes that use the following to shape a material: 1.3.1 heat 1.3.2 light 1.3.3 chemicals 1.4 outline principal methods of forming materials by: 1.4.1 bending or twisting 1.4.2 forging 1.4.3 casting 1.5 research processes that can be used to: 1.5.1 polish 1.5.2 coat 1.5.3 plate a surface to protect or improve the appearance of a product 1.6 demonstrate basic skills related to separating, combining and forming processes 2. describe the characteristics and give examples of permanent, semi permanent and temporary fastening systems 2.1 list and describe common types of mechanical fasteners that are used with metal products 2.2 identify and describe typical bonding techniques that are used to combine metals; e.g., soldering, braze welding, bonding 2.3 describe when to use permanent, semi permanent and temporary fastening techniques 2.4 explain why it may be necessary to change the physical state of some materials before they can be formed 3. demonstrate basic fabrication skills and techniques, using simple hand and power tools 3.1 identify and describe measurement and layout tools that can be used to: 3.1.1 measure and mark a straight line on a metal surface 3.1.2 make an angle of 45° and 90° 3.1.3 create arcs and circles 3.1.4 measure the inside and/or outside dimensions of pipe, round and square stock 2 / CTS, TMT: FAB1100 Introductory 2009 © Alberta Education, Alberta, Canada 3.2 for a given product design, describe the appropriate processes and tools to measure, lay out, shape, condition and finish the materials 3.3 prepare a material list and sequence of events to fabricate a given product design 3.4 describe principles of shop safety 3.5 describe a safety plan in case of an accident 4. demonstrate basic competencies 4.1 demonstrate fundamental skills to: 4.1.1 communicate 4.1.2 manage information 4.1.3 use numbers 4.1.4 think and solve problems 4.2 demonstrate personal management skills to: 4.2.1 demonstrate positive attitudes and behaviours 4.2.2 be responsible 4.2.3 be adaptable 4.2.4 learn continuously 4.2.5 work safely 4.3 demonstrate teamwork skills to: 4.3.1 work with others 4.3.2 participate in projects and tasks 5. make personal connections to the cluster content and processes to inform possible pathway choices 5.1 complete/update a personal inventory; e.g., interests, values, beliefs, resources, prior learning and experiences 5.2 create a connection between a personal inventory and occupational choices.