Butler Community College
Career and Technical Education Division

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COURSE OUTLINE
Shielded Metal Arc Welding I (SMAW I)

Course Description
WE 129. Shielded Metal Arc Welding I (SMAW I). 3 hours credit. Prerequisite: A score at a pre-determined level on a placement instrument. This course will enable the student to recognize and apply proper fundamentals of Shielded Metal Arc Welding (SMAW). The student will: describe the SMAW; demonstrate safe and correct set up of the SMAW workstation; associate SMAW electrode classifications with base metals and joint criteria; demonstrate proper electrode selection and use based on metal types and thicknesses; build pads of weld beads with selected electrodes in the flat and horizontal positions; perform basic SMAW welds on selected weld joints; and perform visual inspection of welds. Safety practices are emphasized.

Course Relevance
The principles learned in this course will allow the student to understand how proper fundamental skills and process analysis in preparation for a position in career of welding. This course will enable the student to develop a base skill level to further the proficiency skills.

Required Materials
Althouse, A.D. (2004). *Modern welding.* Tinley Park, IL: Goodheart-Wilcox Company, Inc.

Learning Outcomes
The intention is for the student to be able to:
1. Demonstrate safety in the use of SMAW.
2. Demonstrate basic SMAW skills using a variety of different electrodes.
3. Explain the fundamental theories of SMAW.

Learning PACT Skills that will be developed and documented in this course
Through involvement in this course, the student will develop ability in the following PACT skill area(s):

Technology Skills
1. Discipline-specific technology
   - Through the use of current industry standards and technology the student will be able to perform specific welding functions using a variety of different electrodes with the SMAW process.

Major Summative Assessment Task(s)
These learning outcome(s) and the Learning PACT skill(s) will be demonstrated by
1. Recognizing and using correct technique and equipment to perform specific weld profiles.

2. Identifying problems and correcting them using industry accepted welding principles.

Course Content

I. Skills or Competencies – Actions that are essential to achieve the course outcomes:
   A. Explain the SMAW Process.
   B. Demonstrate the safe and correct set up of the SMAW workstation.
   C. Relate SMAW electrode classifications with base metals and joint criteria.
   D. Demonstrate proper electrode selection and use based on metal types and thicknesses.
   E. Build pads of weld beads with selected electrodes in the flat position.
   F. Build pads of weld beads with selected electrodes in the horizontal position.
   G. Perform basic SMAW welds on selected weld joints.
   H. Perform visual inspections of welds.

II. Themes – Key recurring concepts that run throughout this course:
   A. Safety
   B. Quality

III. Issues – Key areas of conflict that must be understood in order to achieve the intended outcome:
   A. The force of gravity in relation to molten metal and the various electrodes in different positions
   B. The impact of critical welding fundamentals in relation to proper weld profiles
   C. The importance of key fundamental differences between individual electrodes and the proper manipulation of each

IV. Concepts – Key concepts that must be understood to address the issues:
   A. Heat selection
   B. Proper joint preparation
   C. Process analysis
   D. Terminology
   E. The principles of electrode manipulation

Learning Units

I. Safety in the welding shop
   A. Accidents
   B. General shop safety
   C. Safety in the welding environment
   D. Oxy-fuel Gas Welding and cutting safety
   E. Arc Welding and cutting safety
   F. Resistance welding safety
   G. Safety around welding robots
   H. Special welding process safety

II. SMAW equipment and supplies
   A. Arc Welding power source classifications
   B. Constant current power sources
   C. NEMA Arc Welding power source classifications
   D. Welding leads

E. SMAW electrodes
F. Carbon and low-alloy steel covered electrode classification
G. Non-ferrous electrode classifications
H. Electrodes care
I. Power source remote controls
J. Weld-cleaning equipment
K. Shields and helmets
L. Special arc welder clothing

III. SMAW
A. Direct Current (DC) Arc Welding fundamentals
B. DCEN and DCEP fundamentals
C. Alternating Current (AC) Arc Welding fundamentals
D. Selecting an arc welding machine
E. Starting, stopping, and adjusting the Arc Welding Power Source
F. DC Arc blow
G. Arc welded joint designs

Learning Activities
Learning activities will include classroom lecture and hands-on exercises in both booth and shop.

Grade Determination
The student will be graded on completion of competency assessment tasks and learning activities.