

**The Illinois School for the Deaf**  
**Technology and Engineering (TE) Program of Study**  
**Manufacturing**  
**Welding Technology/Welder**  
**June 2, 2015**

Introduction

Career Pathways in Technology and Engineering (TE): Welding Technology at the secondary level at the Illinois School for the Deaf (ISD) provides preparation for a variety of occupations and assist students with developing skills as employees and community members. The targeted occupations require product knowledge and skills and technology expertise that takes into consideration specialized technology and assistive devices for individuals with hearing loss in addition to excellent human relation skills. The Technology and Engineering program which concentrates on Welding Technology cover occupations in a wide array of areas, including: welders, cutters, solderers, brazers, assemblers and fabricators.

ISD's programs in TE: Welding Technology prepares students for employment in entry level occupations and further career preparation at the postsecondary level. Some students may choose to enter a career right out of high school whereas others may decide to further their education before entering a career. The TE: Welding Technology program prepares students for lifelong learning. The tasks, skills and standards identified by business and industry as necessary for success in these occupations are used as the basis for the instructional program development. To assist students in achieving success in their chosen careers, the ISD TE: Welding Technology programs emphasize the development of skills and knowledge that are transferable to a variety of settings. Additionally, students acquire the competencies and strategies necessary to improve the quality of life in their homes, communities and workplaces and to prepare them to become self-supporting citizens.

The following job outlook for occupations in TE: Welding Technology was summarized from information provided by the Occupational Outlook Handbook. This information was updated in 2012. Jobs as a welder, cutter, solderer, or brazer are projected to increase by 6% from 2012-2022 which is classified as having slower than average growth for this area. Jobs as an assembler and fabricator are projected to increase by 4% from 2012-2022 which is slower than average growth for all occupations.

ISD developed its TE: Welding Technology program from statewide labor market information (LMI). Occupations with related skills have been grouped together to develop instructional programs which provide students with a wide range of opportunities for entry-level employment, career advancement and further education. As new occupations emerge and employment needs are demonstrated, additional programs will be developed. The ISD TE: Welding Technology program includes the following areas:

- Introduction to Technology and Engineering (Industrial)
- Welding Technology I
- Welding Technology II

The TE: Welding Technology program prepares students for assuming the multiple roles of being a wage earner and community member. The program focuses on time management, work ethic, and how to adapt to the ever changing field of technology and engineering.

ISD follows a planned sequence of courses in its TE: Welding Technology program. The content and learning experiences are defined in subject-specific course descriptions. ISD offers two semesters for each course rather than the one semester recommended because generally students who are deaf or hard of hearing face academic challenges and require additional time to learn the skills necessary for these courses. These skills must be formally taught. Because of the intense nature of the teaching, more time is required to cover the course content.

#### Components of ISD's Secondary Technology and Engineering: Welding Technology

ISD's program includes the following components in its instructional programs.

1. Qualified, Certified Professional Educator—ISD's educator is fully qualified and certified as secondary Career Technical Education educator and possesses non-teaching work experience.
2. Student Services--ISD employs appropriate support services and these services are available to all students in the TE: Welding Technology program. Students at ISD have Individualized Education Plans (IEPs); individualized career plans; and individual advisement by the educator and counselor on a regular basis.
3. Sequentially Structured, Aligned Programs--The instruction in the TE: Welding Technology program is based on worker competencies and includes the skills, knowledge and attitudes required for successful employment in the occupations served by the program. Programs include practical, logical, sequentially structured courses and are aligned with the Common Core Standards, and utilizing resources aligned with the American Welding Society Standards.
4. Active Career and Technical Education Student Organizations – ISD is investigating the possibility of establishing a vocational organization for students in the TE: Welding Technology program of study.
5. Facilities and Equipment—the facilities and equipment used in teaching the TE: Welding Technology program is appropriate for the students enrolled in the program. It is adequately designed, installed and maintained to ensure safe operation and use. There is appropriate instructional and storage space. Students participate in hands-on experiences in classroom and shop areas. Students also have the opportunity for job shadowing experiences and student work experiences.
6. Active CTE Advisory Council—ISD has a CTE Advisory Council that holds meetings twice each school year. Meetings and smaller meetings of the whole

will continue to meet and provide direction and support for development and evaluation of instructional programs. Membership of the committee is comprised of employers/employees, students, educators, instructors, DRS staff, LLCC staff, ISBE staff, and community members.

### Technology and Engineering: Welding Technology Course Structure

Orientation-level courses introduce students to all aspects of architecture and construction and serve as a background for all ISD TE: Welding Technology classes offered. This comprehensive course, Introduction to Technology and Engineering (Industrial), is a two semester course which is generally offered to 9<sup>th</sup> grade students and older without a background in technology and engineering. This orientation course exposes students to the resources, technical processes, industrial applications, technological impact and occupations encompassed by that system and allow the students to make meaningful decisions regarding further TE: Welding Technology occupational studies.

Preparation-level courses provide students with experiences that support the acquisition of occupational standards and skills required for developing independent skills and employment. The 10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup>, and Transition grade preparation-level courses provide students with the opportunity to develop marketable job skills as well as preparation for further postsecondary training. All TE: Welding Technology programs include logical, practical, sequential learning experiences for the essential technical skills and are designed to achieve that goal. The goal of ISD is to collaborate with postsecondary programs in order to complete the full scope of instruction.

ISD provides classes that utilize work-sites that give real life experience in TE: Welding Technology areas. The structure and content of the courses follows child labor laws and state rules and regulations. Examples of TE: Welding Technology work sites are: fabrication shops, factories, structural construction sites, and auto body shops.

### **Technology and Engineering: Welding Technology**

This program offers a sequence of planned educational classroom and laboratory experiences including career exploration, record keeping, content knowledge, practical work experiences provided by ISD staff and stakeholders.

Emphasis is placed on developing competencies in the following areas:

- Work place/employability skills
- Safety
- Record keeping
- Content knowledge

## ISD Technology and Engineering: Welding Technology

### Orientation Courses

<b>ISBE Course Number</b>	<b>Course Title</b>	<b>Credits Per Semester</b>	<b>Semester Length</b>	<b>Grade Levels</b>
21052A002	Introduction to Technology and Engineering (Industrial)	0.5	2	9, 10, 11, 12, TLP

### Preparation Courses

<b>ISBE Course Number</b>	<b>Course Title</b>	<b>Credits Per Semester</b>	<b>Semester Length</b>	<b>Grade Levels</b>
13207A001	Welding Technology I	0.5	2	10, 11, 12, TLP
13207A002	Welding Technology II	0.5	2	11, 12, TLP

### Student Work Experience

<b>ISBE Course Number</b>	<b>Course Title</b>	<b>Credits Per Semester</b>	<b>Semester Length</b>	<b>Grade Levels</b>
22206A000	Life Skills	0.5	2	11
22208A000	**Consumer Family Living	0.5	2	12
22210A000	**Consumer Economics/Personal Finance	0.5	2	12
22152A000	Transition Employability Skills	0.5	2	TLP
22998A000	Student Work Experience	0.5	2	12, TLP

\*\* Students will be enrolled in either Consumer Family Living or Consumer Economics/Personal Finance during their 12<sup>th</sup> grade year.

Course Descriptions for the listed classes are in Appendix A.

Curricular Outlines for the listed classes are in Appendix B.

## **APPENDIX A – COURSE DESCRIPTIONS**

**Course Title:** Introduction to Technology and Engineering (Industrial) (ISBE # 21052A002)

**Course Description:** Introduction to Technology & Engineering is comprised of the following areas: Production, Transportation, Communication, Energy Utilization and Engineering Design but is not limited to these areas only. This course will cover the resources, technical processes, industrial applications, technological impact and occupations encompassed by that system.

**Course Title:** Welding Technology I (ISBE #13207A001)

**Course Description:** This course assists students in gaining the knowledge and developing the basic skills needed to be successful in welding technology. Units of instruction include arc, TIG and MIG welding, metallurgy, cutting metal using arc, plasma, and oxy-gas. In addition, students learn the basics of blueprint reading, precision measuring, layout, and production process planning.

**Course Title:** Welding Technology II (ISBE #13207A002)

**Course Description:** This course builds on the skills and concepts introduced in Welding Technology I and provides more in-depth skill development in various types of welding including horizontal, vertical, overhead, and circular techniques. Students also explore the use of robotic and automated production welding.

**Course Title:** Student Work Experience (ISBE # 22998A000)

**Course Description:** Workplace Experience courses provide students with work experience in a field related to their interests. Goals are typically set cooperatively by the student, teacher, and employer (although students are not necessarily paid). These courses may include classroom activities as well, involving further study of the field or discussion regarding experiences that students encounter in the workplace.

## Appendix B – Course Outline

### Introduction to Technology and Engineering (Industrial)

Topic	Length of Unit (Time) in weeks	Math CCSS Standards
OSHA	10 weeks	G.MG.1;7.G.6;N.Q.1
Introduction to Measurement reading	1 week	G.MG.1;7.G.6;N.Q.1
Measurement skill practice lab	2 weeks	G.MG.1;7.G.6;N.Q.1
Shop safety	1 week	G.MG.1;7.G.6;N.Q.1
Hand tools	1 week	G.MG.1;7.G.6;N.Q.1
Machine tools	1 week	G.MG.1;7.G.6;N.Q.1
Assess student operation of machines (no power)	1 week	G.MG.1;7.G.6;N.Q.1
Introduction to Plastic	1 week	G.MG.1;7.G.6;N.Q.1
Plastic lab	3 weeks	G.MG.1;7.G.6;N.Q.1
Introduction to Wood	1 week	G.MG.1;7.G.6;N.Q.1
Wood lab	5 weeks	G.MG.1;7.G.6;N.Q.1
Introduction to Vending machine	1 week	G.MG.1;7.G.6;N.Q.1
Vending machine Lab	3 weeks	G.MG.1;7.G.6;N.Q.1
Introduction to vinyl decals	1 week	G.MG.1;7.G.6;N.Q.1
Vinyl decals lab	3 weeks	G.MG.1;7.G.6;N.Q.1
Final review/wrap up	1 week	G.MG.1;7.G.6;N.Q.1

### Welding Technology I

Topic	Length of Unit (Time) in weeks	Math CCSS Standards
Arc Welding	4 weeks	G.MG.1, 7.G.6, N.Q.1
TIG Welding	4 weeks	G.MG.1, 7.G.6, N.Q.1
MIG Welding	4 weeks	G.MG.1, 7.G.6, N.Q.1
Metallurgy	3 weeks	G.MG.1, 7.G.6, N.Q.1
Arc Cutting	3 weeks	G.MG.1, 7.G.6, N.Q.1
Plasma Cutting	3 weeks	G.MG.1, 7.G.6, N.Q.1
Oxy-Gas Cutting	3 weeks	G.MG.1, 7.G.6, N.Q.1

Blueprint Reading	3 weeks	G.MG.1, 7.G.6, N.Q.1
Precision Measuring	3 weeks	G.MG.1, 7.G.6, N.Q.1
Layout	3 weeks	G.MG.1, 7.G.6, N.Q.1
Production Planning	3 weeks	G.MG.1, 7.G.6, N.Q.1

## **Welding Technology II**

<b>Topic</b>	<b>Length of Unit (Time) in weeks</b>	<b>Math CCSS Standards</b>
Horizontal Welding	6 weeks	G.MG.1, 7.G.6, N.Q.1
Vertical Welding	6 weeks	G.MG.1, 7.G.6, N.Q.1
Overhead Welding	6 weeks	G.MG.1, 7.G.6, N.Q.1
Circular Techniques	6 weeks	G.MG.1, 7.G.6, N.Q.1
Robotic Welding	6 weeks	G.MG.1, 7.G.6, N.Q.1
Automated Production Welding	6 weeks	G.MG.1, 7.G.6, N.Q.1