The Illinois School for the Deaf
Technology and Engineering (TE) Program of Study
Architecture and Construction
Drafting and Design Technology/Technician, General
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Introduction

Career Pathways in Technology and Engineering (TE): Drafting and Design Technology at the secondary level at the Illinois School for the Deaf (ISD) provide 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 Drafting and Design Technology covers occupations in a wide array of areas, including: drafters, architects, mechanical engineering technicians, and mechanical engineering.

ISD's programs in TE: Drafting and Design Technology prepare 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: Drafting and Design 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: Drafting and Design 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: Drafting and Design Technology was summarized from information provided by the Occupational Outlook Handbook. This information was updated in 2012. Jobs in drafting are projected to increase by 1% from 2012-2022 which is classified as having little or no change in growth for this area. According to the Occupational Outlook Handbook, "Although drafters will continue to work on technical drawings and documents related to the design of buildings, machines, and tools, new software programs are making the work more efficient, thus requiring fewer workers. Competition for jobs is expected to be strong." Jobs as an architect are projected to increase by 17% from 2012-2022 which is about as fast as the average for all occupations. Jobs in both the areas of mechanical engineering technicians and mechanical engineering are projected to increase by 5% from 2012-2022 which is slower than average growth.

ISD developed its TE: Drafting and Design 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: Drafting and Design Technology program includes the following areas:

- Beginning Drafting
- Architectural Drafting I
- Architectural Drafting II
- Mechanical Drafting I
- Mechanical Drafting II

The TE: Drafting and Design 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: Drafting and Design 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: Drafting and Design Technology Program

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: Drafting and Design 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: Drafting and Design 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 Illinois Learning

Standards, Common Core Standards, and utilizing resources aligned with the National Drafting Standards Institute.

4. Active Career and Technical Education Student Organizations – ISD is investigating the possibility of establishing a vocational organization for students in the TE: Drafting and Design Technology program of study.
5. Facilities and Equipment—the facilities and equipment used in teaching the TE: Drafting and Design 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 business education partners.

Technology and Engineering: Drafting and Design Technology Course Structure

Orientation-level courses introduce students to all aspects of architecture and construction and serve as a background for all ISD TE: Drafting and Design Technology classes offered. This comprehensive course, Introduction to Technology and Engineering (Industrial), is a two semester course which is generally offered to 9th 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: Drafting and Design 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 10th, 11th, 12th, 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: Drafting and Design 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: Drafting and Design Technology areas. The structure and content of the courses follows child labor laws and state rules and regulations. Examples of TE: Drafting and Design Technology work sites are: drafting, architectural, and engineering firms.

Technology and Engineering: Drafting and Design 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
- Record keeping
- Safety
- Content knowledge

ISD Technology and Engineering: Drafting and Design Technology

Orientation Courses

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

Preparation Courses

ISBE Course Number	Course Title	Credits Per Semester	Semester Length	Grade Levels
21102A002	Beginning Drafting	0.5	2	10, 11, 12, TLP
21103A001	Architectural Drafting I	0.5	2	11, 12, TLP
21103A002	Architectural Drafting II	0.5	2	11, 12, TLP
21106A001	Mechanical Drafting I	0.5	2	11, 12, TLP
21106A002	Mechanical Drafting II	0.5	2	11, 12, TLP

Student Work Experience

ISBE Course Number	Course Title	Credits Per Semester	Semester Length	Grade Levels
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	0.5	2	TLP

	Employability Skills			
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 12th 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: Beginning Drafting (ISBE # 21102A002)

Course Description: Beginning Drafting is an introductory level drafting course. During this course students will learn the basic fundamentals of drafting and/or computer aided drafting (CAD). The instruction will include the care and use of drafting equipment, freehand sketching, orthographic projection, lettering techniques, dimensioning standards, pictorial drawings, drawing reproduction, and an introduction to CAD.

Course Title: Architectural Drafting I (ISBE # 21103A001)

Course Description: This course is designed to provide students interested in a career in Architecture with information and practical experience needed for the development of job-related competencies. Students are made aware of the career opportunities available in the Architectural Drafting and Architectural Drafting CAD - CADD field. Instruction is provided in the areas of planning and organizing activities, researching information, performing general office procedures, preparing of preliminary drawings, basic layout, detail drawings, reproduction techniques, producing working drawings, and computer aided drafting. Students are also provided with instruction in producing architectural drawings in the areas of presentation, floor plans, illustration of landscape features, sketching preliminary floor plans, drawing foundation plans and sections, exterior elevations, stair sections, chimney sections, roof sections, finish schedules, preparing plumbing, HVAC and electrical plans, and structural drawings.

Course Title: Architectural Drafting II (ISBE # 21103A002)

Course Description: Instruction is provided in the areas of locating information using computer data files, determination of materials and availability, project conferences, checking plan dimensions, drawing schematic sketches, preparing scale sketches, producing drawings from written/verbal instructions, application of coordinate dimensioning standards, creating drawings using a plotter/printer, producing renderings and/or charts and graphs, and common plan features. Instruction is also provided in the areas of drawing framing plans, wall sections, fireplace sections, door sections, door and window schedules, dimensioning structural steel drawings, constructing column detail

drawings, preparation of structural foundation, slab and floor plans, drawing electrical, block, schematic, and electrical connection drawings. Skills relating to CAD include preparation of a basic CAD drawing, building and editing a data base, developing a 3-dimensional drawing and selecting appropriate line work, line weight, and color.

Course Title: Mechanical Drafting I (ISBE #21106A001)

Course Description: This course introduces students to layout to scale using specified tolerances, preparing detail drawing for individual parts from drawings, layout and creating assembly drawings, and preparing mechanical orthographic subassembly drawings. This course also includes a sequence of CAD experiences in 2-dimensional and 3-dimensional drawing generation to include vocabulary development, system operation, entity creation, dimensioning and text insertion, plotting, three dimensional coordinate system, 3-D parts detailing and assembly drawings, wire frame models, and system management relative to hard disk and tape storage systems.

Course Title: Mechanical Drafting II (ISBE #21106A002)

Course Description: Instruction is provided in the areas of identifying appropriate interfacing personnel (internal/external), producing renderings and project time schedules, producing structural working drawings as structural steel plans, dimension structural steel drawings, and draw beam connections, and producing electrical and electronic working drawings as electrical and electronic schematic diagrams. Additional skills introduced in this program include determining the requirements of a specific drafting job, preparing preliminary drawings such as freehand, isometric, orthographic, and oblique sketches; preparing detail drawings such as creating assembly drawings, orthographic projections, sectional views, auxiliary views, isometric views and letter drawings; producing mechanical working drawings such as detailing components of mechanical orthographic assembly and subassembly drawings; using CAD command processes as preparing a basic CAD drawing, start up, log on, retrieve, save, log off and shut down CAD system; creating disk files, copying disk files, and generating a grid on drawing.

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

Beginning Drafting

Topic	Length of Unit (Time) in weeks	Math CCSS Standards
Sketching and lettering techniques	1 week	G.MG.1, 7.G.6, N.Q.1
Recite CAD terminology	1 week	G.MG.1, 7.G.6, N.Q.1
Perform windows commands	1 week	G.MG.1, 7.G.6, N.Q.1
Exhibit understanding of CAD hardware	1 week	G.MG.1, 7.G.6, N.Q.1
Use CAD software	3 week	G.MG.1, 7.G.6, N.Q.1
Use hard copy equipment	1 week	G.MG.1, 7.G.6, N.Q.1

Perform measurements using scales	1 week	G.MG.1, 7.G.6, N.Q.1
Identify and apply "Alphabet of Lines"	1 week	G.MG.1, 7.G.6, N.Q.1
Draw geometric constructions	10 weeks	G.MG.1, 7.G.6, N.Q.1
Construct multiview (orthographic 2-D) drawings	10 weeks	G.MG.1, 7.G.6, N.Q.1
Exhibit flat pattern development techniques	6 week	G.MG.1, 7.G.6, N.Q.1

Architectural Drafting I

Topic	Length of Unit (Time) in weeks	Math CCSS Standards
Introduction to Architecture	1 week	G.MG.1, 7.G.6, N.Q.1
Architectural presentation	1 week	G.MG.1, 7.G.6, N.Q.1
Creating floor plans	3 weeks	G.MG.1, 7.G.6, N.Q.1
Illustration of landscaping	2 weeks	G.MG.1, 7.G.6, N.Q.1
Preliminary floor plan sketching	2 weeks	G.MG.1, 7.G.6, N.Q.1
Foundation plans	3 weeks	G.MG.1, 7.G.6, N.Q.1
Exterior elevations	3 weeks	G.MG.1, 7.G.6, N.Q.1
Stair Sections	2 weeks	G.MG.1, 7.G.6, N.Q.1
Chimney Sections	2 weeks	G.MG.1, 7.G.6, N.Q.1
Roof sections	2 weeks	G.MG.1, 7.G.6, N.Q.1
Finish schedules	2 weeks	G.MG.1, 7.G.6, N.Q.1
Plumbing plan	3 weeks	G.MG.1, 7.G.6, N.Q.1
HVAC plan	2 weeks	G.MG.1, 7.G.6, N.Q.1
Electrical plan	3 weeks	G.MG.1, 7.G.6, N.Q.1
Structural drawings	2 weeks	G.MG.1, 7.G.6, N.Q.1

Architectural Drafting II

Topic	Length of Unit (Time) in weeks	Math CCSS Standards
Advanced architectural techniques	2 weeks	G.MG.1, 7.G.6, N.Q.1
Framing plan	2 weeks	G.MG.1, 7.G.6, N.Q.1
Fireplace sections	2 weeks	G.MG.1, 7.G.6, N.Q.1
Door sections	2 weeks	G.MG.1, 7.G.6, N.Q.1
Door and window schedules	2 weeks	G.MG.1, 7.G.6, N.Q.1
Structural steel drawings	2 weeks	G.MG.1, 7.G.6, N.Q.1
Column design	2 weeks	G.MG.1, 7.G.6, N.Q.1
Structural foundation	2 weeks	G.MG.1, 7.G.6, N.Q.1
Floor plans	2 weeks	G.MG.1, 7.G.6, N.Q.1
Drawing electrical	2 weeks	G.MG.1, 7.G.6, N.Q.1
Creating blocks	2 weeks	G.MG.1, 7.G.6, N.Q.1
Laying out schematics	2 weeks	G.MG.1, 7.G.6, N.Q.1
Electrical drawings	2 weeks	G.MG.1, 7.G.6, N.Q.1
Basic CAD drawings	2 weeks	G.MG.1, 7.G.6, N.Q.1
Creating a database	2 weeks	G.MG.1, 7.G.6, N.Q.1
3-D drawings	2 weeks	G.MG.1, 7.G.6, N.Q.1

Mechanical Drafting I

Topic	Length of Unit (Time) in weeks	Math CCSS Standards
Layout to scale	2 weeks	G.MG.1, 7.G.6, N.Q.1
Tolerances	2 weeks	G.MG.1, 7.G.6, N.Q.1
Preparing detail drawings	2 weeks	G.MG.1, 7.G.6, N.Q.1
Layout and creating drawings	2 weeks	G.MG.1, 7.G.6, N.Q.1
Subassembly drawings	2 weeks	G.MG.1, 7.G.6, N.Q.1
Vocabulary	2 weeks	G.MG.1, 7.G.6, N.Q.1
System operation	2 weeks	G.MG.1, 7.G.6, N.Q.1
Entity creation	3 weeks	G.MG.1, 7.G.6, N.Q.1
Dimensioning	3 weeks	G.MG.1, 7.G.6, N.Q.1
Text insertion	2 weeks	G.MG.1, 7.G.6, N.Q.1
Plotting	2 weeks	G.MG.1, 7.G.6, N.Q.1

3-D coordinate system	3 weeks	G.MG.1, 7.G.6, N.Q.1
3-D part detail	3 weeks	G.MG.1, 7.G.6, N.Q.1
Assembly drawings	3 weeks	G.MG.1, 7.G.6, N.Q.1
Wire frame models	3 weeks	G.MG.1, 7.G.6, N.Q.1

Mechanical Drafting II

Topic	Length of Unit (Time) in weeks	Math CCSS Standards
Renderings	2 weeks	G.MG.1, 7.G.6, N.Q.1
Time schedules	2 weeks	G.MG.1, 7.G.6, N.Q.1
Structural drawings	2 weeks	G.MG.1, 7.G.6, N.Q.1
Dimensioning	2 weeks	G.MG.1, 7.G.6, N.Q.1
Beam connections	2 weeks	G.MG.1, 7.G.6, N.Q.1
Electronic drawings	2 weeks	G.MG.1, 7.G.6, N.Q.1
Freehand drawings	2 weeks	G.MG.1, 7.G.6, N.Q.1
Oblique drawings	2 weeks	G.MG.1, 7.G.6, N.Q.1
Assembly drawings	2 weeks	G.MG.1, 7.G.6, N.Q.1
Orthographic projections	2 weeks	G.MG.1, 7.G.6, N.Q.1
Sectional views	2 weeks	G.MG.1, 7.G.6, N.Q.1
Auxiliary views	2 weeks	G.MG.1, 7.G.6, N.Q.1
Lettering drawings	2 weeks	G.MG.1, 7.G.6, N.Q.1
Working drawings	2 weeks	G.MG.1, 7.G.6, N.Q.1
Detailing components	2 weeks	G.MG.1, 7.G.6, N.Q.1
Orthographic assemblies	2 weeks	G.MG.1, 7.G.6, N.Q.1
Orthographic subassemblies	2 weeks	G.MG.1, 7.G.6, N.Q.1
Basic CAD drawings	1 week	G.MG.1, 7.G.6, N.Q.1
CAD system management	1 week	G.MG.1, 7.G.6, N.Q.1