

St. John-Endicott Cooperative Schools Industrial Technology/Technology Curriculum Standards

**with
Performance Indicators**

Program Standards

- Understand technical systems and applications.
- Be able to analyze and solve technical problems.
- Understand effective management of resources (family, business, nation).
- Be able to assess and prepare for occupations.
- Be familiar with a variety of technical occupations.
- Be able to apply cooperative skills to the work place.
- Be able to apply basic skills from other subjects (such as science, math, and language arts) to technology and technical occupations.

Industrial Technology Standards Fifth-Ninth Grade

Apply the standards below to each of these four areas.

1. **Communications industry.**
 - A. Graphics: drafting, printing, photography.
 - B. Electronics: radio, television, keyboarding, audio-visual, satellite, laser, fiberoptics, etc.
2. **Production industry.**
 - A. Construction: residential, commercial, civil.
 - B. Manufacturing: mass production, custom, CIM.
3. **Transportation.**
 - A. Aerospace.
 - B. Land.
 - C. Water.
4. **Power and energy.**
 - A. Fossil fuels: renewable, nonrenewable.
 - B. Alternative sources: solar, muscle, gravitational, geothermal, and nuclear.

Course Abilities [Apply the following to each content standard.]

1. **Develop abilities with technology.**
 - A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
 - B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
 - C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
 - D. The quality process (plan, draft, analyze, and revise when producing products).
2. **Be able to apply technical knowledge and skills to a variety of purposes.**
 - A. Be able to support positions in a responsible manner (research, thesis, organize support, recommendations).
 - B. Possess technical skills:
 - read/write/present: instructions, table, chart, progress report, specifications, proposal, letters (complaint, request, application, recommendation), manual, form, checklist, resume, tech. research, bid, tech. analysis, summary
 - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production
3. **Be employable.**
 - A. Be able to use technology and tools appropriately (safely, effectively, efficiently, accurately).
 - B. Possess employability skills
 - work well with others (contribute to group success, allow others to contribute, resolve own conflicts)
 - productive thinker/worker (short and long-term goals, comfortable with technology, use higher thinking)
 - responsible (follow directions, use time wisely, meet deadlines, responsible without supervision)
 - produce quality work (plan major projects, use quality process, benefit from criticism, persist)
 - C. Be able to present yourself in an employable manner.
 - written communications (resume, letter of application, filling out forms)
 - verbal skills (appearance, interviewing skills).
 - portfolio (projects, products, skills, abilities, technology, experiences, accomplishments, awards)
 - D. Possess career knowledge (types of jobs, job opportunities, benefits, requirements, prerequisite skills).

Course Content

4. **Be able to use proper procedures and methods when problem-solving.**
 - A. Be able to apply problem-solving skills (define problem, analyze problem, research solutions, select solution, implement solution, evaluate results).
 - B. Be able to assess own strengths/weaknesses as a problem-solver to determine own best strategies.
5. **Understand and apply the design concept.**
 - A. Be able to develop and evaluate/analyze working plans and drawings, prototype model, and a final solution.
 - B. Be able to construct final end product which meets design criteria.
 - C. Be able to "sell" the end product to a mock or real audience.
6. **Be able to follow instructions or directions.**
 - A. Be able to read technical plans/manuals, taking appropriate notes and making effective highlight markings.
 - B. Be able to determine and apply the steps/procedures indicated in the technical plans/manuals.
7. **Be able to use equipment and materials in a proper, safe, and considerate manner.**
 - A. Know the names, purposes, safety rules/procedures, and storage place for all equipment.
 - B. Know when equipment is not working properly and safely.
 - C. Know and apply the general safety rules/procedures for the industrial technology lab or work place.
8. **Be familiar with present and possible future career opportunities in this field.**
 - A. Know about current and be able to predict future related careers.
 - B. Know how to research current job market information.
 - C. Be able to explain own interest in various technical careers.

Industrial Technology Standards

Basic Woods

Course Abilities [Apply the following to each content standard.]

1. Develop abilities with technology.

- A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
- B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
- C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
- D. The quality process (plan, draft, analyze, and revise when producing products).

2. Be able to apply technical knowledge and skills to a variety of purposes.

- A. Be able to support positions in a responsible manner (research, thesis, organize support, recommendations).
- B. Possess technical skills:
 - read/write/present: instructions, table, chart, progress report, specifications, proposal, letters (complaint, request, application, recommendation), manual, form, checklist, resume, tech. research, bid, tech. analysis, summary
 - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

3. Be employable.

- A. Be able to use equipment appropriately (safely, effectively, efficiently, accurately).
- B. Possess employability skills:
 - work well with others (contribute to group success, allow others to contribute, resolve own conflicts)
 - productive thinker/worker (short and long-term goals, comfortable with technology, use higher thinking)
 - responsible (follow directions, use time wisely, meet deadlines, responsible without supervision)
 - produce quality work (plan major projects, use quality process, benefit from criticism, persist)
- C. Be able to present yourself in an employable manner:
 - written communications (resume, letter of application, filling out forms)
 - verbal skills (appearance, interviewing skills)
 - portfolio (projects, products, skills, abilities, technology, experiences, accomplishments, awards)
- D. Possess career knowledge (types of jobs, job opportunities, benefits, requirements, prerequisite skills).

Course Content

4. Be able to use tools, materials, and equipment in a proper, safe, and considerate manner.

- A. Be able to determine proper attire, maintain proper tool adjustments, and use tools for their intended purposes.
- B. Be able to perform tasks according to industrial safety standards.

5. Be able to read and make a plan of materials, drawings, and patterns.

- A. Be able to interpret plans, specifications, and sectional views from blueprints, charts, graphs, and tables.
- B. Be able to identify key factors affecting decisions (money, time, space, skills, materials).
- C. Be able to make accurate computations (area, volume, and estimate materials, time, and costs).
- D. Be able to make simple sketches and plans.
- E. Be able to make a bill of materials.

6. Be able to use safe and proper procedures and methods in assembling projects.

- A. Be able to use safe and proper setup procedures for scaffolds, ladders, and riggings.
- B. Be able to identify and use appropriate materials to complete job properly and safely.
- C. Know and be able to apply assembly methods.
- D. Be able to develop and follow a plan of procedure.
- E. Know and be able to execute five basic joints.

7. Be able to use multiple machines and techniques to construct projects.

- A. Be able to determine and follow a correct sequence of operations.
- B. Be able to conserve materials.
- C. Be able to use proper techniques.

8. Be able to use finishing materials and tools to complete projects.

- A. Be able to select the proper finish for durability, safety, compatibility, and aesthetics.
- B. Be able to properly apply a finish.
- C. Be able to use proper finishing procedures, knowing and applying all safety and clean-up procedures.

9. Possess a general knowledge of the lumber industry and its environmental implications.

- A. Know about current related careers (benefits, responsibilities, requirements, life style).
- B. Be able to research current job market information.
- C. Know the impact of the lumber industry on the environment and ways to reduce the negative effects.

Industrial Technology Standards

Advanced Woods

Course Abilities [Apply the following to each content standard.]

1. Develop abilities with technology.

- A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
- B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
- C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
- D. The quality process (plan, draft, analyze, and revise when producing products).

2. Be able to apply technical knowledge and skills to a variety of purposes.

- A. Be able to support positions in a responsible manner (research, thesis, organize support, recommendations).
- B. Possess technical skills:
 - read/write/present: instructions, table, chart, progress report, specifications, proposal, letters (complaint, request, application, recommendation), manual, form, checklist, resume, tech. research, bid, tech. analysis, summary
 - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

3. Be employable.

- A. Be able to use equipment appropriately (safely, effectively, efficiently, accurately).
- B. Possess employability skills:
 - work well with others (contribute to group success, allow others to contribute, resolve own conflicts)
 - productive thinker/worker (short and long-term goals, comfortable with technology, use higher thinking)
 - responsible (follow directions, use time wisely, meet deadlines, responsible without supervision)
 - produce quality work (plan major projects, use quality process, benefit from criticism, persist)
- C. Be able to present yourself in an employable manner:
 - written communications (resume, letter of application, filling out forms)
 - verbal skills (appearance, interviewing skills)
 - portfolio (projects, products, skills, abilities, technology, experiences, accomplishments, awards)
- D. Possess career knowledge (types of jobs, job opportunities, benefits, requirements, prerequisite skills).

Course Content

4. Be able to use tools, materials, and equipment in a proper, safe, and considerate manner.

- A. Be able to determine proper attire, maintain proper tool adjustments, and use tools for their intended purposes.
- B. Be able to perform tasks according to industrial safety standards.

5. Be able to read or develop a set of drawings based on applicable codes and tolerances.

- A. Be able to interpret plans, sectional views from blueprints, charts, graphs, and tables.
- B. Be able to read and interpret specifications and recognize and interpret lines, views, dimensions, and symbols.
- C. Be able to make and use clear and complete sets of plans based on accurate measurements and calculations.

6. Be able to develop a materials list and calculate costs from a set of drawings.

- A. Be able to make accurate measurements and computations and research for costs.
- B. Be able to develop itemized materials and cost lists, including wood, hardware, finishing products, other consumables.
- C. Be able to make any necessary modifications to stay within cost limitations.

7. Be able to follow proper methods and procedures in completing projects.

- A. Be able to set up, adjust, and use all power tools and machines correctly and safely.
- B. Be able to make accurate computations and measurements with several instruments.
- C. Be able to develop and follow an efficient order of operations and perform basic layout operations.

8. Be able to select and use a variety of methods in construction and assembly.

- A. Know and be able to execute assembly methods (gluing, fasteners, joints, combinations).
- B. Be able to select the correct method for specific situations, checking for accuracy/quality of each step.
- C. Be able to select and use the best tool/equipment and application of the tool for the operation.

9. Be able to select and use finishing materials correctly and safely.

- A. Be able to select the proper finish for durability, safety, compatibility, and aesthetics.
- B. Be able to use proper finishing procedures, knowing and applying all safety and clean-up procedures.

10. Be able to complete a major project using all learned standards.

- A. Be able to complete a major project which is complete, aesthetically pleasing, soundly constructed, durable, fulfills the plans, and serves the intended purpose.
- B. Be able to evaluate the project according to proper criteria and assess the plan and assembly procedure.
- C. Be able to "sell" the plan to a mock or real audience.

Industrial Technology Standards

Metals Fabrication

Course Abilities [Apply the following to each content standard.]

1. Develop abilities with technology.

- A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
- B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
- C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
- D. The quality process (plan, draft, analyze, and revise when producing products).

2. Be able to apply technical knowledge and skills to a variety of purposes.

- A. Be able to support positions in a responsible manner (research, thesis, organize support, recommendations).
- B. Possess technical skills:
 - read/write/present: instructions, table, chart, progress report, specifications, proposal, letters (complaint, request, application, recommendation), manual, form, checklist, resume, tech. research, bid, tech. analysis, summary
 - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

3. Be employable.

- A. Be able to use equipment appropriately (safely, effectively, efficiently, accurately).
- B. Possess employability skills:
 - work well with others (contribute to group success, allow others to contribute, resolve own conflicts)
 - productive thinker/worker (short and long-term goals, comfortable with technology, use higher thinking)
 - responsible (follow directions, use time wisely, meet deadlines, responsible without supervision)
 - produce quality work (plan major projects, use quality process, benefit from criticism, persist)
- C. Be able to present yourself in an employable manner:
 - written communications (resume, letter of application, filling out forms)
 - verbal skills (appearance, interviewing skills)
 - portfolio (projects, products, skills, abilities, technology, experiences, accomplishments, awards)
- D. Possess career knowledge (types of jobs, job opportunities, benefits, requirements, prerequisite skills).

Course Content

4. Be able to use metal working tools, machines, and materials in proper and safe manner.

- A. Be able to determine proper attire, maintain proper tool adjustments, and use tools for their intended purposes.
- B. Be able to perform tasks according to industrial safety standards.

5. Understand the use of various types of metals.

- A. Know and be able to identify common ferrous and nonferrous metals and alloys.
- B. Know properties of metals (hardness, tensile strength, elasticity, machinability, compressive strength, ductility, shear strength, and heat conductivity).

6. Be able to use a variety of metals fabrication techniques properly and safely.

- A. Be able to perform common drilling operations using correct drill bits, counter sinks, reamers, and tap drills.
- B. Be able to perform grinding operations (identify types of abrasives, use grinding wheel, sharpen tools).
- C. Be able to perform common sawing operations (identify types of power sawing equipment, select proper blade, perform proper cutting procedures).
- D. Be able to perform heat treating procedures (hardening, tempering, annealing, case hardening, flame hardening).
- E. Be able to identify and use various coolants and lubricants.

7. Be able to identify and make five different welds with gas, MIG, TIG, and arc welders.

- A. Be able to apply procedures for welding (set machine, prepare metal for welding, select proper electrode, perform machine adjustments, control distortion, and perform welds in various positions).
- B. Be able to weld with oxy-fuel welders, arc welders, inert gas welders (MIG, TIG, plasma).

8. Be able to complete major projects from a set of drawings.

- A. Be able to read/interpret and draw technical manuals, charts, tables, specifications, basic layouts.
- B. Be able to apply basic mathematics from a set of drawings to complete a major project.
- C. Be able to estimate materials, time, and cost in completing a major project.
- D. Be able to use formulas to solve welding-related computational problems.
- E. Be able to complete major projects which include a series of welds, cuts, drills, saws, grinds, and heat treating.

Industrial Technology Standards

Automotive Technology

Course Abilities [Apply the following to each content standard.]

1. Develop abilities with technology.

- A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
- B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
- C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
- D. The quality process (plan, draft, analyze, and revise when producing products).

2. Be able to apply technical knowledge and skills to a variety of purposes.

- A. Be able to support positions in a responsible manner (research, thesis, organize support, recommendations).
- B. Possess technical skills:
 - read/write/present: instructions, table, chart, progress report, specifications, proposal, letters (complaint, request, application, recommendation), manual, form, checklist, resume, tech. research, bid, tech. analysis, summary
 - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

3. Be employable.

- A. Be able to use equipment appropriately (safely, effectively, efficiently, accurately).
- B. Possess employability skills:
 - work well with others (contribute to group success, allow others to contribute, resolve own conflicts)
 - productive thinker/worker (short and long-term goals, comfortable with technology, use higher thinking)
 - responsible (follow directions, use time wisely, meet deadlines, responsible without supervision)
 - produce quality work (plan major projects, use quality process, benefit from criticism, persist)
- C. Be able to present yourself in an employable manner:
 - written communications (resume, letter of application, filling out forms)
 - verbal skills (appearance, interviewing skills)
 - portfolio (projects, products, skills, abilities, technology, experiences, accomplishments, awards)
- D. Possess career knowledge (types of jobs, job opportunities, benefits, requirements, prerequisite skills).

Course Content

4. Be able to demonstrate knowledge of safety in auto mechanics.

- A. Be able to determine proper attire, maintain proper tool adjustments, and use tools for their intended purposes.
- B. Be able to perform tasks according to industrial safety standards.

5. Possess a working familiarity with the main systems of the automobile.

- A. Know the electrical system of the automobile (sources, basic circuitry, direct and alternating current).
- B. Know the ignition system (purpose, types, battery, standard, breakerless and solid-state ignition, spark plug management, contact points, condensers, coil, timing).
- C. Know the fuel and induction systems (purpose, types, carburetor, fuel filter, fuel pump, air cleaner, electronic fuel, injection system).
- D. Know lubrication system (purpose, types, crankcase breather, specifications, manufacturer recommendations).
- E. Know miscellaneous systems (cooling, speed control, exhaust, air pollution/emissions, steering, suspension, brakes, transmission).
- F. Be familiar with computerized diagnostic equipment and innovations in automotive industry.
- G. Be able to use computerized parts and information catalog.

6. Be able to demonstrate trouble-shooting skills related to auto mechanics.

- A. Be able to use diagnostic and testing equipment (proper use, make accurate readings, follow through).
- B. Be able to do preventive maintenance (cleaning, lubrication, servicing filters, spark plugs, belts, bearings).
- C. Be able to use technical manuals/information systems (sources of technical information, interpretation of information, use of information to correct problems).
- D. Be able to apply computational skills (apply mathematics, interpret charts, graphs, solve problems using formulas).
- E. Be able to apply measurement related to automobile (know instruments, correct use, basic units, steps in using).

7. Be able to demonstrate knowledge of internal combustion engine and drive train.

- A. Know types of mechanical motion found in engines.
- B. Know the process by which an engine converts chemical energy to rotary motion.
- C. Know basics of engine functions (crankshaft positions, firing order, valve arrangements, engine timing).

Industrial Technology Standards

Architectural Design

Course Abilities [Apply the following to each content standard.]

1. Develop abilities with technology.

- A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
- B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
- C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
- D. The quality process (plan, draft, analyze, and revise when producing products).

2. Be able to apply technical knowledge and skills to a variety of purposes.

- A. Be able to support positions in a responsible manner (research, thesis, organize support, recommendations).
- B. Possess technical skills:
 - read/write/present: instructions, table, chart, progress report, specifications, proposal, letters (complaint, request, application, recommendation), manual, form, checklist, resume, tech. research, bid, tech. analysis, summary
 - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

3. Be employable.

- A. Be able to use equipment appropriately (safely, effectively, efficiently, accurately).
- B. Possess employability skills:
 - work well with others (contribute to group success, allow others to contribute, resolve own conflicts)
 - productive thinker/worker (short and long-term goals, comfortable with technology, use higher thinking)
 - responsible (follow directions, use time wisely, meet deadlines, responsible without supervision)
 - produce quality work (plan major projects, use quality process, benefit from criticism, persist)
- C. Be able to present yourself in an employable manner:
 - written communications (resume, letter of application, filling out forms)
 - verbal skills (appearance, interviewing skills)
 - portfolio (projects, products, skills, abilities, technology, experiences, accomplishments, awards)
- D. Possess career knowledge (types of jobs, job opportunities, benefits, requirements, prerequisite skills).

Course Content

4. Understand how residences are planned (functions, space, other requirements).

- A. Know about the different functions, space requirements of a residence.
- B. Know about plumbing, electrical, and HVAC construction detail requirements of a residence.
- C. Know laws concerning residential design.

5. Understand the correct procedure for formulating a set of working drawings.

- A. Be able to select appropriate drawing tools (lead holders, lead, technical pawns, compasses, erasers).
- B. Be able to select appropriate drawing medium (paper, vellum mylar, sepia).
- C. Be able to operate drafting machines (track, elbow, parallel bar).
- D. Be able to operate reproduction equipment.
- E. Be able to use mathematical principles (area, volume, weight, angles, conversion and construct and divide lines, arcs, circles, curves, ellipses, polygons).

6. Be able to apply architectural styles, designs, and techniques and select from common construction materials.

- A. Know about various architectural styles, designs, and techniques (purposes/themes/foci, decorative elements/details, advantages/disadvantages).
- B. Be able to integrate knowledge of styles, designs and techniques into own designs.
- C. Know about common construction materials (composition, advantages/disadvantages, cost factors).
- D. Be able to integrate knowledge of materials into own designs.

7. Be able to draw a detailed set of plans (correct notations, dimensions, symbols).

- A. Be able to produce orthographic/pictorial sketches and drawings (axiometric, oblique, perspective, isometric).
- B. Be able to produce renderings or technical illustrations using accepted design principles.
- C. Be able to follow appropriate drafting standards (Architectural Graphic Standards, local building codes).
- D. Be able to use standard drawing symbols to designate objects, details, and appropriate information.
- E. Be able to read and interpret blueprints.

8. Be able to use and be adaptable to new technology in architectural design.

- A. Be able to operate input and output devices (graphic tablet, mouse, keyboard, plotter, printer, CRT).
- B. Be able to use a CAD system to draw.
- C. Be familiar with computerized drafting equipment.

Industrial Technology Standards Electronics

Course Abilities [Apply the following to each content standard.]

1. Develop abilities with technology.

- A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
- B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
- C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
- D. The quality process (plan, draft, analyze, and revise when producing products).

2. Be able to apply technical knowledge and skills to a variety of purposes.

- A. Be able to support positions in a responsible manner (research, thesis, organize support, recommendations).
- B. Possess technical skills:
 - read/write/present: instructions, table, chart, progress report, specifications, proposal, letters (complaint, request, application, recommendation), manual, form, checklist, resume, tech. research, bid, tech. analysis, summary
 - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

3. Be employable.

- A. Be able to use equipment appropriately (safely, effectively, efficiently, accurately).
- B. Possess employability skills:
 - work well with others (contribute to group success, allow others to contribute, resolve own conflicts)
 - productive thinker/worker (short and long-term goals, comfortable with technology, use higher thinking)
 - responsible (follow directions, use time wisely, meet deadlines, responsible without supervision)
 - produce quality work (plan major projects, use quality process, benefit from criticism, persist)
- C. Be able to present yourself in an employable manner:
 - written communications (resume, letter of application, filling out forms)
 - verbal skills (appearance, interviewing skills)
 - portfolio (projects, products, skills, abilities, technology, experiences, accomplishments, awards)
- D. Possess career knowledge (types of jobs, job opportunities, benefits, requirements, prerequisite skills).

Course Content

4. Be able to use proper and safe procedures with tools, equipment, and materials.

- A. Be able to determine proper attire, maintain proper tool adjustments, and use tools for their intended purposes.
- B. Be able to perform tasks according to industrial safety standards.
- C. Know safety procedures for working with high voltage equipment.

5. Understand the concepts and components of direct current.

- A. Know direct circuits (series, parallel, combination, voltage, divider, and bridge).
- B. Be able to apply Kirchoff's law for current and voltage and Ohm's law.
- C. Be able to calculate voltage drops (series and parallel) and power for components.
- D. Know joule, work, power, watt, dissipation, and the role of magnetism.

6. Understand the concepts and components of alternating current.

- A. Know different wave forms of alternating current and be able to compare alternating with direct current.
- B. Be able to calculate the RMS, peak, P/D, and instantaneous value of an AC wave.
- C. Be able to measure alternating currents (voltmeter, ammeter, oscilloscope).
- D. Be able to construct a capacitive circuit and RLC circuit in series and parallel.
- E. Be able to calculate resonant frequency of a circuit and demonstrate effects of series and parallel resonance.

7. Understand direct and alternating current schematic diagrams.

- A. Be able to identify and draw basic symbols for battery lamp, resistor, conductor, and switch.
- B. Be able to identify and draw symbols for generators (AC and DC), transformer, connected and not connected conductors, variable resistors, inductors, capacitors, diodes, and transistors.
- C. Be able to read/explain schematic AC and DC diagrams and construct working models from schematic diagrams.

8. Understand various types of electricity uses.

- A. Know residential electricity (kilowatt hour meters, electrical generation systems, electrical distribution systems, tools used, types and uses of conductors, conductor preparation and splicing, protection devices).
- B. Know semiconductor devices (PN junctions, use of an ohmmeter, production of a semiconductor, types of diodes, NPN and PNP transistors, polarity, Beta and collector dissipation, C-E and C-C amplifiers).
- C. Know industrial control systems (symbols for SCRS, TRIACS, and DIACS, full wave control, switching, electromechanical relay circuits, robotics, servomotor circuits, stepper motor).
- D. Know digital/logic systems (convert between binary, decimal, and hexadecimal, Boolean expressions, manufacturer symbols, 7400 logic gates, D-type flip-flops, truth tables, 4-bit serially loaded shifts, block diagrams).

Industrial Technology Standards

Technical Drafting

Course Abilities [Apply the following to each content standard.]

1. Develop abilities with technology.

- A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
- B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
- C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
- D. The quality process (plan, draft, analyze, and revise when producing products).

2. Be able to apply technical knowledge and skills to a variety of purposes.

- A. Be able to support positions in a responsible manner (research, thesis, organize support, recommendations).
- B. Possess technical skills:
 - read/write/present: instructions, table, chart, progress report, specifications, proposal, letters (complaint, request, application, recommendation), manual, form, checklist, resume, tech. research, bid, tech. analysis, summary
 - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

3. Be employable.

- A. Be able to use equipment appropriately (safely, effectively, efficiently, accurately).
- B. Possess employability skills:
 - work well with others (contribute to group success, allow others to contribute, resolve own conflicts)
 - productive thinker/worker (short and long-term goals, comfortable with technology, use higher thinking)
 - responsible (follow directions, use time wisely, meet deadlines, responsible without supervision)
 - produce quality work (plan major projects, use quality process, benefit from criticism, persist)
- C. Be able to present yourself in an employable manner:
 - written communications (resume, letter of application, filling out forms)
 - verbal skills (appearance, interviewing skills)
 - portfolio (projects, products, skills, abilities, technology, experiences, accomplishments, awards)
- D. Possess career knowledge (types of jobs, job opportunities, benefits, requirements, prerequisite skills).

Course Content

4. Be able to express ideas through graphic representation.

- A. Be able to select appropriate drawing tools (lead, technical pens, compasses, erasers).
- B. Be able to select appropriate drawing medium (paper, vellum, mylar, sepia).
- C. Be able to operate drafting machines (track, elbow, parallel bar).
- D. Be able to operate reproduction equipment.

5. Be able to use specific criteria when analyzing or producing a design.

- A. Be able to use appropriate line weights and types to complete drawings.
- B. Be able to letter quickly and legibly according to industry standards.
- C. Be able to use standard drawing symbols to designate objects, details, and other appropriate information.
- D. Be able to read and interpret blueprints.

6. Be able to determine and represent sectional drawings.

- A. Be able to produce pictorial sketches and pictorial drawings (axiometric, oblique, perspective, isometric).
- B. Be able to produce renderings or technical illustrations using accepted design principles.

7. Understand mathematical principles necessary for drafting.

- A. Be able to calculate area, volume, weight, angles and convert between fractions-decimals and English-metric units.
- B. Be able to use geometric construction procedures to divide lines, arcs, and circles.
- C. Be able to construct parallels, perpendiculars, and tangents lines, circles, curves, ellipses, and polygons.

8. Be able to interpret/construct correct developments of flat planes to three-dimensional objects.

- A. Be able to produce preliminary design drawings for a residential or light commercial building.
- B. Be able to identify building materials commonly used in construction.
- C. Be able to assemble a simple architectural model to study a proposed project.
- D. Be able to construct floor plan drawings and evaluate heat loss and other environmental considerations.
- E. Be able to design and draw related plans (electrical, plumbing, HVAC, construction details).
- F. Be able to construct elevations to show exterior and drainage patterns.

9. Be able to use and be adaptable to new technology in technical drafting.

- A. Be able to operate input devices (graphic tablet, mouse, keyboard), output devices (plotter, printer, and CRT).
- B. Be able to compare computer equipment (speed, accuracy, effectiveness, cost, ease of use, ease of learning).
- C. Be able to construct a CAD drawing of an object.

Industrial Technology Standards

Graphic Communication

Course Abilities [Apply the following to each content standard.]

1. Develop abilities with technology.

- A. Higher thinking (analyze, evaluate, classify, predict, estimate, generalize, solve, decide, relate, interpret, simplify).
- B. Communications (present, demonstrate, persuade, collaborate, explain, defend, recommend).
- C. Goal setting/attainment (brainstorm, envision, research, plan, organize, persist).
- D. The quality process (plan, draft, analyze, and revise when producing products).

2. Be able to apply technical knowledge and skills to a variety of purposes.

- A. Be able to support positions in a responsible manner (research, thesis, organize support, recommendations).
- B. Possess technical skills:
 - read/write/present: instructions, table, chart, progress report, specifications, proposal, letters (complaint, request, application, recommendation), manual, form, checklist, resume, tech. research, bid, tech. analysis, summary
 - technology: word processing, spreadsheet, database, desktop publishing, Internet, search tools, AV production

3. Be employable.

- A. Be able to use equipment appropriately (safely, effectively, efficiently, accurately).
- B. Possess employability skills:
 - work well with others (contribute to group success, allow others to contribute, resolve own conflicts)
 - productive thinker/worker (short and long-term goals, comfortable with technology, use higher thinking)
 - responsible (follow directions, use time wisely, meet deadlines, responsible without supervision)
 - produce quality work (plan major projects, use quality process, benefit from criticism, persist)
- C. Be able to present yourself in an employable manner:
 - written communications (resume, letter of application, filling out forms)
 - verbal skills (appearance, interviewing skills)
 - portfolio (projects, products, skills, abilities, technology, experiences, accomplishments, awards)
- D. Possess career knowledge (types of jobs, job opportunities, benefits, requirements, prerequisite skills).

Course Content

4. Use proper and safe procedures when working with printing tools, equipment, and materials.

- A. Be able to determine proper attire, maintain proper tool adjustments, and use tools for their intended purposes.
- B. Be able to perform tasks according to industrial safety standards.

5. Understand correct printing processes.

- A. Know the four major printing processes (relief, intaglio, lithography, and screen).
- B. Be able to use correct layout and design (selecting type styles, thumbnails/roughs, correct layout and design).
- C. Be able to apply basic computational skills (measurement, scale, and interpretation of charts and tables).
- D. Be able to use computer-generated type and graphics (operate computer equipment, apply design techniques, use desktop publishing software).

6. Be able to work with the printing process.

- A. Know platemaking (appropriate material, exposure, additives/subtractives, electrostatic plates, plate evaluation).
- B. Know color theory (additive/subtractive colors, color selection, color separation, four color process, types of ink).
- C. Know basics of presswork (techniques, safety aspects, ink selection, ink preparation, selection of paper, dampening system, proof and evaluation of copy, cleaning and maintenance of presses).
- D. Know bindery and finishing operations such as cutting and trimming to size, assembling (collating, drilling, binding, folding), mounting, and packaging.

7. Use photography in printing (calculate exposures, develop film, make enlargements, tone).

- A. Know picture taking (lighting, process cameras, exposure).
- B. Know film development (diffusion transfer, lithography, halftones, enlargements and reductions, use of chemicals).
- C. Know film image assembly (assembling flats, complimentary flats, masking flats, proof and evaluation of flats).

8. Be able to produce quality products using correct procedures.

- A. Be able to produce one and two color silk screen prints (copy preparation, fabric selection and preparation, masking screen, ink selection and preparation, printing of screen, finishing).
- B. Be able to produce line and halftone photography and positives.
- C. Be able follow the procedures for plate-making and stripping.
- D. Be able to produce one and two color prints (brochures, envelopes, posters).
- E. Be open to using computers and technologies to aid in printing.