Construction Trades

The following matrix indicates those courses deemed transferable among institutions listed across the top of the matrix. The numbers on the matrix represent the number of semester hours associated with the course at each institution and which institutions have agreed to transfer the commonly numbered course in each row.

You can view the group leaders at the bottom of the page. If you are interested in printing this page, please note that it is best to print in landscape mode.

Architectural Drafting & Estimating

Prefix	Number	Gerta	Course Title	NDSCS	UTTC
ARCT	101		Architectural Drafting I	3-5	
ARCT	102		Architectural Drafting II	5	
ARCT	133		Residential Methods and Material	3	
ARCT	134		Structural Wood Design	2	
ARCT	140		Construction Blueprint Reading	2	2
ARCT	144		Construction Estimating I	4	4
ARCT	201		Architectural Drafting III	5	
ARCT	202		Architectural Drafting IV	4	
ARCT	212		Architectural Presentation Techniques	3	
ARCT	223		Renovation and Design	3	
ARCT	224		Plane Surveying	1	
ARCT	225		Mechanical & Electrical Systems	2	

ARCT	234		Structural Steel Detailing I	3	
ARCT	241		Construction Estimating II	3	
ARCT	242		Construction Estimating III	3	
ARCT	250		Construction Documents	3	
ARCT	251		Construction Specifications	2	
ARCT	252		Project Coordination	3	
ARCT	253		Construction Scheduling	3	

ARCT 101 Architectural Drafting I
This course introduces the basics of engineering drawing including orthographic and isometric drawing, lettering, lineweights and dimensioning. These concepts are then applied to architectural drafting projects. Students will learn the step-by-step process for designing and laying out a set of working drawings for a residential home.

ARCT 102 Architectural Drafting II
This course is a continuation of residential construction. Students will draw a complete set of working drawings for a two-story house. Stair sections, framing plans, truss construction, and a study of kitchen layouts and elevations are included. Prerequisite: ARCT 101.

ARCT 133 Residential Methods and Material
This course is an introduction to methods of construction, and the terminology and use of building materials.

ARCT 134 Structural Wood Design
A course to introduce the sizing of structural members used in light wood frame building construction. A working knowledge of building codes and sizing terminology is emphasized. Prerequisite: ARCT 133.

ARCT 140 Construction Blueprint Reading
A study of residential and light commercial construction prints. Emphasis is placed on the interpretation of linework, symbols, and details commonly shown in light commercial building prints.

ARCT 144 Construction Estimating I
This course is an introduction to residential material and labor estimating. Material lists, calculations, and costs are made for several different houses and pole type construction. Prerequisite: ARCT 133.

ARCT 201 Architectural Drafting III
This course includes an introduction to split-level house details, a partial set of working drawings for an apartment building and introduction to pre-engineering metal buildings. Students are required to use CAD to develop their drawings. Prerequisite: ARCT 102.

ARCT 202 Architectural Drafting IV
This course includes an extensive introduction to pre-engineered metal buildings and a more in-depth coverage of light commercial conventional buildings. Prerequisite: ARCT 201.

ARCT 212 Architectural Presentation Techniques
Techniques of graphic communication, projection, and introduction to color media as tools for the architectural designer. Prerequisite: ARCT 101.

ARCT 223 Renovation and Design
This course is a practical introduction to the techniques of upgrading, rehabilitation and design of older residential and commercial structures to meet the needs of today's customer. Roof designs with complex intersections are studied. Prerequisite: ARCT

ARCT 224 Plane Surveying
This course is a study of elementary plane surveying and the equipment used. Practical field problems are involved using the engineer's level and transit.

ARCT 225 Mechanical & Electrical Systems
A course to introduce mechanical and electrical equipment, their functions and space requirements as they relate to the construction industry.

ARCT 234 Structural Steel Detailing I
This course covers the structural steel industry, the documents used in structural steel, the detailing of the beams and girders, the detailing of columns, connection options, as well as vertical and horizontal bracing. The CD series developed by the American Institute of Steel Construction (AISC) is used as the lecture portion of the course, and practical drawing assignments are assigned to reinforce the information provided. Prerequisite: ARCT 133, ARCT 233, MATH136, or departmental approval.

ARCT 241 Construction Estimating II
This course covers manual and computer assisted estimating procedures. Several light commercial and multi-family buildings will be estimated. Labor costs will be included with all the computer assisted projects. Prerequisite: ARCT 144.

ARCT 242 Construction Estimating III
This course covers manual takeoff procedures for large commercial buildings. All calculations are with a computer assisted estimating program. Students become familiar with contracting procedures and reading specifications. Calculating man-hours for various construction tasks is also included. Prerequisites: ARCT 144 and ARCT 241.

ARCT 250 Construction Documents
A study of documents used in the construction industry such as: payment requests, change orders, addenda, specifications, bonds, etc. The study of these documents is used to present the "Project Delivery Process" of a construction project. Prerequisites:

ARCT 251 Construction Specifications

ARCT 252 Project Coordination

ARCT 253 Construction Scheduling

Building Construction Tech

Prefix	Number	Gerta	Course Title	BSC	NDSCS	CCCC	TMCC	UTTC
BCT	102		Core Curriculum		2	2	2	
BCT	110		Concrete & Sitework		4			
BCT	111		Concrete Theory		1			
BCT	115		Introduction to Wood Frame Construction		2			
BCT	130		Wood Frame Construction		7			
BCT	133		Carpentry Fundamentals		3		3	
BCT	141		Principles of Commercial Structures	3				
BCT	142		Commercial Structures	6				
BCT	145		Construction Materials					2
BCT	151		Principles of Commercial Interior Finish	3				
BCT	152		Commercial Interior Finish	6				
BCT	210		Light Commercial Framing & Construction		9			
BCT	212		Metal Building Assemblers Training		1			
BCT	220		Job Site Responsibilities		3			
BCT	222		Construction Safety		2		2	
BCT	224		Building Layout		1			1

BCT	230		Interior Finishing for Light Commercial Construction		7			
BCT	233		Carpentry Framing and Finishing		3	3	3	
BCT	240		Commercial Blueprint Reading		3			

BCT 102 Core Curriculum
Core Curriculum from the National Center for Construction Education and Research (NCCER), consists of eight modules which are: “Basic Safety”; “Construction Math”; “Hand Tools”; “Power Tools”; “Blueprints”; “Basic Rigging”; “Communication Skills”; and “Employability Skills”. This course is a prerequisite for all NCCER “Craft Level Training,” (regardless of the craft).

BCT 110 Concrete & Sitework
This course is an introduction to the methods of forming, pouring and finishing concrete. Students will get the experience and knowledge with both flat and vertical applications of concrete for the light commercial construction industry.

BCT 111 Concrete Theory
This course covers the information required to produce, place and finish concrete which will have desirable and lasting qualities.

BCT 115 Introduction to Wood Frame Construction
This course is designed to provide an introduction to numerous methods of wood frame construction such as floor, wall, and roof framing. The installation of exterior roof and wall finish materials including doors and windows. Students will completely construct a wood frame structure as part of this course.

BCT 130 Wood Frame Construction
This course is designed to provide experience in numerous construction methods such as floor, wall, roof and stair framing. The installation of exterior finish materials including doors and windows is also taught. Students will completely form a wood frame structure as part of this course. Prerequisite: BCT 120.

BCT 133 Carpentry Fundamentals
Carpentry Fundamentals from the National Center for Construction Education and Research (NCCER), consists of ten modules which are: “Orientation to the Trade”; “Building Materials, Fasteners, and Adhesives”; “Hand and Power Tools”; “Reading Plans and Elevations”; “Floor Systems”; “Wall and Ceiling Framing”; “Roof Framing”; “Introduction to Concrete and Reinforcing Materials”; “Windows and Exterior Doors”; and “Basic Stair Layout”.

BCT 141 Principles of Commercial Structures
This course will give students exposure to various commercial structural systems used locally. Classroom presentations and construction site visits will emphasis design and construction practices.

BCT 142 Commercial Structures
This course is designed to give students exposure to and experience in the roles of commercial carpenters. There will be demonstrations by those in the field as well as observations of projects under construction. Techniques learned in principles of Commercial Construction will be applied through an actual Commercial Construction project.

BCT 145 Construction Materials
This course is designed to expose the learner to a broad range of materials, methods and techniques commonly used in the construction industry.

BCT 151 Principles of Commercial Interior Finish
The course will give students the knowledge needed by carpenters and craftsmen in commercial construction. Classroom presentations by skilled craftsmen and professionals proficient in the field will be made. Job site visits will be made to buildings under construction as well as complete structures.

BCT 152 Commercial Interior Finish
The course will give the students exposure to the principles of and skills necessary to entry level positions as a commercial interior carpenter. Labs will include demonstrations by skilled craftsman and hands on activities.

BCT 210 Light Commercial Framing & Construction
This course provides experience and knowledge of how to work with commercial construction materials. Methods of construction pre-engineered structures, and steel construction including commercial floor, roof, and interior wall systems will be taught. Equipment usage and safety will be emphasized. Prerequisite: BCT 130.

BCT 212 Metal Building Assemblers Training
This computer-assisted training course prepares students in the terminology, practices, and safety procedures for assembling metal buildings. When a student successfully finishes this course, they receive a certification of completion.

BCT 220 Job Site Responsibilities
This course will be a study in construction job site responsibilities such as supervision, coordination, scheduling, conflict resolution and interpretation of construction documents. The emphasis will be on site management. Prerequisite: BCT 210.

BCT 222 Construction Safety
Construction Safety is a minimum of 30 hours of safety topics related to the construction industry. Topics covered will include: “Introduction to Occupational Safety and Health Act (OSHA)”; “Hazard Communication”; “Personal Protective Equipment”; “Work Zone Safety”; “Electrical and High Voltage Hazards”; “Fire Protection and Prevention”; “Hand and Power Tool Safety”; “Welding Safety”; “Fall Protection”; “Steel Erection” “Walking and Working Surfaces”; “Ladders and Scaffolding”; “Horizontal Directional Drilling Hazards”; “Heavy-Equipment, Crane, and Rigging Safety”; “Trenching Safety”; “Forklift Safety”; “Lockout/Tagout”; “Confined Spaces”; “Concrete and Masonry”; “Ergonomics”; “Bloodborne Pathogens for Construction”; as well as several other Safety topics. Upon completion of this course students will receive a “30 Hour OSHA Safety Card” and a certificate from the National Center for Construction Education and Research (NCCER). Attendance at each of the 30 Hour topics is mandatory.

BCT 224 Building Layout
This course will present and reinforce concepts regarding elements commonly found on prints of large structures. Included are types of construction, specifications, site work, structural steel construction, reinforced concrete construction, mechanical and electrical systems and finish construction found on commercial projects. Students will become familiar

with terms and symbols that are commonly used in commercial blueprints.

BCT 230 Interior Finishing for Light Commercial Construction
This course provides experience and knowledge of the skills and techniques required to perform in the field of finish carpentry. Methods of installing millwork items, cabinets and finished hardware will be emphasized. Prerequisite: BCT 210.

BCT 233 Carpentry Framing and Finishing
Carpentry Framing and Finishing from the National Center for Construction Education and Research (NCCER), consists of twelve modules which are: “Commercial Drawings”; “Roofing Applications”; “Thermal and Moisture Protection”; “Exterior Finishing”; “Cold-Formed Steel Framing”; “Drywall Installation”; “Drywall Finishing”; “Doors and Door Hardware”; “Suspended Ceilings”; “Window, Door, Floor, and Ceiling Trim”; “Cabinet Installation”; and “Cabinet Fabrication”.

BCT 240 Commercial Blueprint Reading

Carpentry

Prefix	Number	Gerta	Course Title	BSC	NDSCS	CCCC	TMCC	UTTC
CARP	102		Core Curriculum	2	2	2	2	
CARP	105		Construction Math			2		
CARP	110		Blueprint Reading	2				
CARP	115		Site Layout and Foundation Construction	3				
CARP	120		Principles of Framing	3				
CARP	125		Framing I	6				6
CARP	130		Exterior Finish	2				2

CARP	133		Carpentry Fundamentals		3		3	
CARP	135		Framing II	4				4
CARP	140		Principles of Interior Finish	3				3
CARP	145		Interior Finish	6				6
CARP	150		Cabinetmaking	3				3
CARP	155		Computer Aided House Design	2				
CARP	160		Concrete Systems Technology	2				
CARP	175		Construction Equipment	4				
CARP	222		Construction Safety				2	

CARP 102 Core Curriculum
Core Curriculum from the National Center for Construction Education and Research (NCCER), consists of eight modules which are: “Basic Safety”; “Construction Math”; “Hand Tools”; “Power Tools”; “Blueprints”; “Basic Rigging”; “Communication Skills”; and “Employability Skills”. This course is a prerequisite for all NCCER “Craft Level Training,” (regardless of the craft). This course is also offered with a prefix of BCT.

CARP 105 Construction Math
Provides the student with an understanding and basic principles of construction math. Includes area, volume, lengths, and angles in relationship to building materials and properties.

CARP 110 Blueprint Reading
Designed to provide the basic understanding of standard residential blueprints including plot plans, foundation plans, floor plans, elevations, details of mechanical and electrical plans, and a basic understanding of residential building codes.

CARP 115 Site Layout and Foundation Construction
Students will receive training and hands-on experience in preparation of a building site and foundation construction. Instruction will include laying out building lines, establishing batter boards, concrete footings and foundations, and studying alternate foundation systems.

CARP 120 Principles of Framing
This is a comprehensive course which concerns instruction and study on the techniques and practices required for successful employment as a framing carpenter. Areas covered will include layout of floors and walls, engineering truss systems, joist and rafter systems, and stairway construction.

CARP 125 Framing I
This lab will increase the student's knowledge, skills, and proficiency in framing by applying the techniques learned in 120 Principles of Framing. Activities will center around the actual construction of a house.

CARP 130 Exterior Finish
This course deals with the basics of residential exterior finish. Instruction will include units on fascia and soffit construction, windows and exterior door installation, and siding and roofing.

CARP 133 Carpentry Fundamentals
Carpentry Fundamentals from the National Center for Construction Education and Research (NCCER), consists of ten modules which are: “Orientation to the Trade”; “Building Materials, Fasteners, and Adhesives”; “Hand and Power Tools”; “Reading Plans and Elevations”; “Floor Systems”; “Wall and Ceiling Framing”; “Roof Framing”; “Introduction to Concrete and Reinforcing Materials”; “Windows and Exterior Doors”; and “Basic Stair Layout”. This course is also offered with a prefix of BCT.

CARP 135 Framing II
This course is designed to increase students knowledge and skill in residential construction. Activities will center around specialty exterior and interior framing during the construction of an actual house.

CARP 140 Principles of Interior Finish
This course provides an understanding of materials and processes used in interior finishing. Instruction will include units in drywall, interior doors, interior trim, floor underlayment and applying finishes.

CARP 145 Interior Finish
This lab will increase the student's knowledge, skills and proficiency in interior finishing by applying techniques learned in 140-Principles of Interior Finish. Activities will center around the construction of an actual house.

CARP 150 Cabinetmaking
Instruction in the design and layout of kitchens, cabinets, vanities, countertops, and built-in closets. Students will increase their knowledge, skill, and proficiency through actual construction of cabinets.

CARP 155 Computer Aided House Design
The student will learn room planning, experience hands-on training of skills to use computers aided architectural design software.

CARP 160 Concrete Systems Technology
This course is designed to give students an understanding of the basics of concrete. Presentations and visits to the offices, plants, and laboratories of concrete construction professionals and specialists are planned.

CARP 175 Construction Equipment
This course will combine classroom presentations, demonstrations, videos, and safe operating procedures. Safety will be emphasized.

CARP 222 Construction Safety
Construction Safety is a minimum of 30 hours of safety topics related to the construction industry. Topics covered will include: “Introduction to Occupational Safety and Health Act (OSHA)”; “Hazard Communication”; “Personal Protective Equipment”; “Work Zone Safety”; “Electrical and High Voltage Hazards”; “Fire Protection and Prevention”; “Hand and Power Tool Safety”; “Welding Safety”; “Fall Protection”; “Steel Erection” “Walking and Working Surfaces”; “Ladders and

Scaffolding”; “Horizontal Directional Drilling Hazards”; “Heavy-Equipment, Crane, and Rigging Safety”; “Trenching Safety”; “Forklift Safety”; “Lockout/Tagout”; “Confined Spaces”; “Concrete and Masonry”; “Ergonomics”; “Bloodborne Pathogens for Construction”; as well as several other Safety topics. Upon completion of this course students will receive a “30 Hour OSHA Safety Card” and a certificate from the National Center for Construction Education and Research (NCCER). Attendance at each of the 30 Hour topics is mandatory. This course is also offered with a prefix of BCT.

Computer Aided Drafting

Prefix	Number	Gerta	Course Title	BSC	NDSCS
CAD	110		Introduction to CadKey		3-4
CAD	120		Introduction to AutoCAD		3
CAD	210		Intermediate CADKey		2
CAD	211		Computer Aided Design I	3	
CAD	212		Computer Aided Design II	3	
CAD	215		Advanced CAD		2
CAD	220		Intermediate AutoCAD		2
CAD	230		Automated Mapping/Facilities Management		3

CAD 110 Introduction to CadKey
This course is an introduction to the basic operation and applications of CAD Release 14 and CAM (computer aided manufacturing) as a computer aided drafting and design tool.

CAD 120 Introduction to AutoCAD
This course is an introduction to the operation and application of computer aided drafting utilizing AutoCAD Release 14 software. Drawing and editing commands are studied and utilized in a final project.

CAD 210 Intermediate CADKey
The operation and applications of intermediate CAD as used in computer aided drafting. Drafting projects and practice using CAD techniques.

CAD 211 Computer Aided Design I
An introduction to coputer-aided graphics, with an emphasis on two dimensional drawings. Drafting is done with the aid of microcomputers using AUTO CAD software. Prerequisites: Graphical Communication 101.

CAD 212 Computer Aided Design II
A continuation of CAD I. Isometric and 3-D drawings are introduced. AUTO CAD is used to solve various engineering problems, including problems involving statics, surveying and machine design.

CAD 215 Advanced CAD
Selected topics in computer drafting. Project credits to be assigned, based on tasks needed. Advanced CAD methods and techniques.

CAD 220 Intermediate AutoCAD
A further study of computer aided drafting using AutoCAD software. Advanced dimensioning, blocks, attributes and libraries are studied and utilized in a final project. An introduction to 3-D drawing is included. Prerequisite: CAD 120.

CAD 230 Automated Mapping/Facilities Management
This course consists of a comprehensive compilation of base maps, land information and public utilities information and the conversion of these data to digital media capable of being queried by GIS (Geographic Information System) or other related software. Prerequisites: CAD 220.

Heating, Ventilation and Air Conditioning Program

Prefix	Number	Gerta	Course Title	BSC	UTTC
HVAC	100		Introduction to Heating, Ventilation and Air Conditioning	3	

HVAC	103		Air Conditioning Theory and Components	5	
HVAC	104		Heating Theory and Components	4	
HVAC	113		Air Conditioning System Troubleshooting	5	
HVAC	114		Heating Systems Troubleshooting	5	
HVAC	120		Building Service Systems		3

HVAC 100 Introduction to Heating, Ventilation and Air Conditioning
A basic introduction to the air conditioning, heating, and refrigeration, and sheet metal trade covering safety tools, equipment, and the fundamentals of electricity.

HVAC 103 Air Conditioning Theory and Components
A lecture and discussion course covering the theory of residential cooling. This will include different types of compressors, evaporators, condensers, metering devices, refrigerants and electrical components.

HVAC 104 Heating Theory and Components
A lecture and discussion course covering residental heating systems. This will include the operation and maintenance of gas, oil and electric furnaces as well as electronic air cleaners and humidifiers.

HVAC 113 Air Conditioning System Troubleshooting
A lecture, discussion and lab course covering residential cooling systems. This will include electrical components, wiring, electrical troubleshooting and mechanical troubleshooting.

HVAC 114 Heating Systems Troubleshooting
A lecture and discussion class covering the wiring and troubleshooting of residential gas, oil and electric furnaces through the use of trainers and live equipment.

HVAC 120 Building Service Systems
This course is designed to expose the learner to the building service systems, which include Heating, Ventilating and Air Conditioning (HVAC), plumbing, electrical and maintenance of the above systems.

Plumbing

Prefix	Number	Gerta	Course Title	NDSCS
PLMB	101		Plumbing Theory and Code	4
PLMB	102		Plumbing Theory and Code	4
PLMB	105		Core Curriculum for Plumbers	2
PLMB	111		Plumbing Lab	6
PLMB	112		Plumbing Lab	6
PLMB	132		Plumbing Drawing, Sketching & Design	4

PLMB 101 Plumbing Theory and Code
A study of the history of the plumbing trade from the earliest historical records to the present. Also covers the development of materials, fittings, and fixtures to provide adequate supplies of potable water to fixtures, and the removal of waste water and water-borne wastes for the comfort and protection of people. Included is a detailed study of the state code as it regulates our trade and protects the public health.

PLMB 102 Plumbing Theory and Code
A continued study of the State Code as it regulates environmental sanitation for the protection of public health. Also includes a study of the materials and installation methods that require a minimum of service and maintenance. Students will obtain practice in isometric sketching and material take-off.

PLMB 105 Core Curriculum for Plumbers
The Core Curriculum consists of eight individual modules which are: Basic Safety Introduction to Construction Math,

Introduction to Hand Tools, Introduction to Power Tools, Introduction to Blueprints, Basic Rigging, Basic Communication Skills, and Basic Employability Skills.

PLMB 111 Plumbing Lab
Practice in safe handling, operation and maintenance of commonly used had and power tools. Introduction to various types of materials, their related fittings, and the trade terminology involved. Students will develop skills in the areas of: screwed threads, cast iron no-hub, sweat solder and solvent weld joints. Students will also rough-in various plumbing systems and install water heaters and accessories.

PLMB 112 Plumbing Lab
Further practice in joint applications by assembly and offset problems. Also covered are laying building sewer piping and water service piping, and the hazards and safety precautions of trench work. Students will rout-in building drains, drainage and vent piping, and water distribution piping. Students will also install fixtures, water softeners, hydronic systems and other plumbing devices. The property methods of repairing and maintaining various plumbing and hydronic equipment are emphasized as well as using the proper tools and supplies.

PLMB 132 Plumbing Drawing, Sketching & Design
A study and practice in measuring, drawing, sketching and blueprint reading, with a detailed study of the plan view, isometric views and other areas that pertain to the entire plumbing and mechanical installations. Included is a detailed study in reading architectural plans and specifications.

Refrigeration & Air Conditioning

Prefix	Number	Gerta	Course Title	BSC	NDSCS
REFG	101		Refrigeration Technology		3
REFG	102		Refrigeration Technology		3
REFG	104		Refrigerants: Chemistry and Ecology		1
REFG	110		Graphic Comm'n/Print Reading		2

REFG	111		Fabrication Lab		2
REFG	112		Domestic and Residential Systems Lab		2
REFG	201		Commercial Refrigeration		3
REFG	202		Refrigeration Technology		3
REFG	211		Commercial Components Lab		2
REFG	212		Advanced Systems Lab		2
REFG	215		Light Commercial Refrigeration	2	
REFG	216		Domestic Refrigeration	3	
REFG	231		Air Conditioning Design		3
REFG	232		Air Conditioning Design		3
REFG	255		Heating Equipment Lab		3

REFG 101 Refrigeration Technology
A study of the basic heat laws, characteristics of refrigerants and separate component parts of the refrigeration system. This includes refrigerant controls and basic electrical controls found in refrigeration. It also includes electrical diagrams an schematics for refrigerators, freezers, heat pumps and commercial defrost.

REFG 102 Refrigeration Technology
A study of different types of compressors and their applications. This course also covers the study of ideal gas laws and other thermodynamic processes. The pressure-enthalphy diagram is used as a tool to illustrate the refrigerant changes in the cycle. The absorption system is also covered.

REFG 104 Refrigerants: Chemistry and Ecology
This course is a study of the chemical composition of the refrigerants commonly used in the refrigeration and air

conditioning industry. The effects of the refrigerants on the environment will be discussed in depth as well as the acceptable service procedures recommended by the Environmental Protection Agency for preventing the release of refrigerants to the atmosphere.

REFG 110 Graphic Comm'n/Print Reading

REFG 111 Fabrication Lab
This course introduces special tools and instruments used in the refrigeration and air conditioning field and their use in performing basic operations. This involves the handling of cooper tubing and pipe, fittings, gauges and manifold. Adjusting of refrigerant controls, temperature controls and charging of systems are also covered.

REFG 112 Domestic and Residential Systems Lab
This course covers the diagnosis of abnormal pressures, use of torches, soldering techniques and electrical wiring of refrigeration systems. Included are jobs on pumpdown cycles, TEVs, special solders and relays. Students learn to evacuate systems for cleaning and charging.

REFG 201 Commercial Refrigeration
This course includes the study of the mechanisms and applications found in commercial and industrial refrigeration, such as defrost systems, ice makers, unloaders, winter controls and computerized pressure controls. Designs of evaporators, condensers, cooling towers, closed circuit evaporative water coolers, and supermarket systems are studied. Cycles in refrigeration are analyzed and plotted on the pressure enthalpy diagram. The usage method of calculating heat leads is covered.

REFG 202 Refrigeration Technology
The selection of thermostatic expansion valves and distributors, and their recommended installation practices are covered. Also covered is lad estimation by the usage and air change methods. Staging, cascade systems and pilot operated valves are studied as well as centrifugal compressors, unit balancing and line sizing by the velocity method.

REFG 211 Commercial Components Lab
This course will explore the special components that are used with commercial refrigeration equipment and examine their applications in operating systems. Attention will be given to system balance, operating controls, compressor analysis, defrost methods, capacity controls, head pressure controls and refrigerant oil management systems. Prerequisites: REFG 101, REFG 201, REFG 201 or equivalent.

REFG 212 Advanced Systems Lab

REFG 215 Light Commercial Refrigeration
A lecture, discussion, and lab course covering some smaller commercial systems, ice machines, system accessories and troubleshooting of this equipment. Prerequisite: Must have successfully completed Semesters I and II.

REFG 216 Domestic Refrigeration
The operation, components, wiring and troubleshooting of residential refrigerators and freezers are covered in this course. This class consists of lecture, discussion and lab. Prerequisite: Must have successfully completed semesters I and II.

REFG 231 Air Conditioning Design

REFG 232 Air Conditioning Design

REFG 255 Heating Equipment Lab

Sheet Metal Tech

Prefix	Number	Gerta	Course Title	BSC
SMTL	105		Sheet Metal I	3
SMTL	106		Sheet Metal II	6
SMTL	107		Sheet Metal III	4

SMTL	115		Practical Principles of Sheet Metal I	4
SMTL	116		Practical Principles of Sheet Metal II	3
SMTL	117		Practical Principles of Sheet Metal III	2

SMTL 105 Sheet Metal I
This course is a lecture and drafting class providing an introduction to the sheet metal industry. Covered in this course are safety, tools of the sheet metal industry, trade math I, and parallel line pattern development.

SMTL 106 Sheet Metal II
This course is a lecture, drafting, and lab class covering trade math II, basic piping practices, sheet metal duct fabrication standards, soldering, insulation, basic piping practices, and radial line pattern development.

SMTL 107 Sheet Metal III
This discussion ,lecture, and lab class covers the following aspects of the sheet metal industry: principles of airflow; associated equipment; fiberglass duct; field measuring and fitting; and triangulation.

SMTL 115 Practical Applications of Sheet Metal
This lecture and lab course applies theory to actual shop practices including: principles of layout; parallel line pattern development; fasteners, hangers, and supports.

SMTL 116 Practical Principles of Sheet Metal II
A course applying theory to actual shop practice including: fabrication II - radial line development; soldering; insulation; basic piping practices; sheet metal duct fabrication standards; gutters and downspouts; roof flashing. All curriculum is based on the NCCER's "Wheels of Learning" and is nationally registered. Prerequisites: SMTL 105, SMTL 110, SMTL 115; successful completion of Fall Semester; concurrent registration in SMTL 106 and SMTL 111 or departmental approval.

SMTL 117 Practical Principles of Sheet Metal III
A course applying theory to actual shop practice including: fabrication III - triangulation; introduction to welding, brazing and cutting; field measuring and fitting. All curriculum is based on the NCCER's "CONTRENDS" curricula and is nationally registered. Prerequisites: SMTL 105, SMTL 106, SMTL 110, SMTL 111, SMTL 115, SMTL 116; must have successfully completed semesters I and II; concurrent registration in SMTL 205 or departmental approval.

The following individuals are leaders for this discipline. Those marked with an asterisk (*) are chairs.

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Director of Academic Affairs