Construction and Manufacturing Technology

The Construction Technology program provides preparation for a wide variety of positions in the construction field as a contractor, supervisor, building inspector or tradesperson. The program offers the opportunity to be self-employed and the pride and satisfaction of creating and building with your own hands.

Certificates of achievement can be earned in Construction Management, Building Construction, Building Inspection, Public Works, HVAC/R, Plumbing and Electrical & Residential Maintenance. The Associate in Science degree is awarded upon completion of 18 semester units in Construction Technology courses and the required general education and elective courses. Transfer to the CSU system for a bachelor's degree in Industrial Technology is available.

Career Opportunities

Building Inspector, Cabinetmaker, Construction Accountant, Construction Estimator, Construction Insurance Agent, Construction Law Specialist, Construction Salesperson, Construction Supervisor, Contractor, Cement Mason, Civil Engineer, Electrician, Environmental Construction Specialist, Financial Specialist, Framer, Grader, Hazardous Materials Specialist, Heating and Air Conditioning, Engineer, Job Foreman, Materials Engineer, Millwright, Metal Building Specialist, Painter, Plumber, Plasterer, Project Supervisor, Public Works Technician, Purchasing Agent, Safety Specialist, Soils Engineer, Surveyor, Tinsmith, Waste Water Specialist, Water Distribution System Specialist, Workers Comp Specialist

Associate Degree

To earn an Associate in Science degree with a major in Construction Technology a minimum of 22.5 units must be completed as specified on the following page. and the student must meet all Victor Valley College graduation requirements.

Transfer

Some Construction Technology courses transfer to CSU as electives or may fulfill subject credit requirements. Some students in this program choose to pursue a bachelor's degree in Architecture or Engineering. See Architecture and Engineering for transfer requirements for these majors.

CSU Stanislaus, located in the Central Valley not far from the San Francisco Bay area, offers a B.S. degree in Applied Studies Leadership, to which up to 30 units of VVC's Construction and Manufacturing Technology courses can be applied. Prerequisites: BADM 101, CIS 101, ECON 102, and MATH 120, plus complete the remaining CSU General Education-Breadth requirements (you can use ECON 102 and MATH 120 for both). Visit www.assist.org for the most up-to-date information.

Degrees and Certificates Awarded

Associate in Science, Construction Technology
Construction Technology Certificate
Basic Heating, Ventilation and Air Conditioning/Refrigeration Certificate
Basic Residential Maintenance Technician Certificate
Basic Woodworking Certificate
Building Inspector Certificate
Basic Machining Certificate of Career Preparation
Construction Management Certificate
Basic Electrician Technician Certificate
Building Construction Certificate
Plumbing Technician Certificate
Renewable Energy Certificate
Public Works Certificate

Program Learning Outcomes

A student receiving a degree or certificate in this field will be able to:

- Identify procedures and strategies to minimize safety hazards and environmental impact associated with construction and manufacturing projects.
- Properly perform construction and manufacturing trade work following standard industry practice.
- Describe building code and legal requirements associated with construction and manufacturing projects.

Construction and Manufacturing Technology

CONTSTRUCTION TECHNOLOGY, A.S. (07564)

To earn an Associate in Science degree with a major in Construction Technology a minimum of 22.5 units must be completed from the following list of departmental classes and the student must meet all Victor Valley College graduation requirements.

Units Required: 22.5

Group I - All of the following must be completed:		
CT 101	Careers in Construction and Manufacturing	1.5
CT 103	Construction Management	3.0
CT 104	Construction Law	3.0
CT 106	Materials of Construction	3.0
CT 110	Building Codes and Zoning	3.0
CT 116	Construction Safety	2.0
CT 131	Microcomputers in Construction	4.0
Group II - One of the following must be completed:		
CT 105	Technical Sketching	3.0
CT 107	Technical Math	3.0
CT 108	Advanced Technical Math	3.0
CIDG 103	Blueprint Reading for Construction	3.0

CONSTRUCTION TECHNOLOGY CERTIFICATE

Provides the core knowledge and skills that are common and fundamental to success in a wide variety of construction trades.

Units Required: 19.5

Group I - All of the following must be completed:		
CT 101	Careers in Construction and Manufacturing	1.5
CT 105	Technical Sketching	3.0
CT 106	Materials of Construction	3.0
CT 116	Construction Safety	2.0
CT 131	Microcomputers in Construction	4.0
CIDG 103	Blueprint Reading for Construction	3.0
Group II - One of the following must be completed:		
CT 107	Technical Math	3.0
CT 108	Advanced Technical Math	3.0

BUILDING CONSTRUCTION CERTIFICATE OF ACHIEVEMENT (10799)

Provides the basic knowledge and skills necessary for job opportunities in a wide variety of specific construction trades including masonry, finish carpentry, framing, construction sales, drywall, painting, plumbing, electrical, roofing, heating, ventilation and air conditioning, and surveying.

Units Required: 18.0	*Students must complete their Construction Technology Certificate plus all the following:*	
Group I - All of the following must be completed:		
CT 132	Construction Estimation	3.0
Group II - Two of the following must be completed:		
CT 120A	Electrical Wiring	4.0
CT 120B	Commercial Wiring	4.0
CT 121	Finish Carpentry	4.0
CT 122A	Heating and Air Conditioning	4.0
CT 122B	Commercial Refrigeration	4.0
CT 123	Surveying	4.0
CT 124	Plumbing	4.0
CT 125	Concrete and Masonry Construction	4.0
CT 127	Framing	4.0
Group III - 7 units of the following must be completed:		
CT 60A	Construction Laboratory	1-4
CT 60B	Construction Laboratory	1-4
CT 60C	Construction Laboratory	1-4
CT 60D	Construction Laboratory	1-4
CT 148	Special Topics	1-6

BUILDING INSPECTION CERTIFICATE OF ACHIEVEMENT (07565)

Provides a thorough background and skill level for employment in the building inspection field. This certificate prepares the student for employment in City and County Building and Safety departments as a private industry or corporate job site inspector.

Units Required: 21.0	*Students must complete their Construction Technology Certificate plus all the following:*	
CT 110	Building Codes and Zoning	3.0
CT 111A	International Building Code I	3.0
CT 111B	International Building Code II	3.0
CT 112	Uniform Mechanical Code	3.0
CT 113	Uniform Plumbing Code	3.0
CT 114	National Electrical Code	3.0
CT 115	Technical Office Procedures and Field Inspection	3.0

Construction and Manufacturing Technology

CONSTRUCTION MANAGEMENT CERTIFICATE OF ACHIEVEMENT (07566)

Provides the skills and background necessary for employment as a contractor, construction business manager, construction supervisor, or foreman when linked with appropriate, trade-specific knowledge.

Units Required: 18.0-19.0	*Students must complete their Construction Technology Certificate plus all the following:*	
Group I - All of the following must be completed:		
CT 103	Construction Management	3.0
CT 104	Construction Law	3.0
CT 109	Construction Financing	3.0
CT 110	Building Codes and Zoning	3.0
CT 132	Construction Estimation	3.0
Group II - One of the following must be completed:		
BADM 101	Financial Accounting	4.0
BADM 103	Financial Accounting Fundamentals	3.0

BASIC ELECTRICIAN TECHNICIAN CERTIFICATE OF CAREER PREPARATION

This certificate provides the necessary knowledge and skill level required for employment in the electrical industry.

Units Required: 16.0	*Students must complete their Construction Technology Certificate plus all the following:*	
Group I - All of the following must be completed:		
CT 114	National Electrical Code	3.0
CT 116	Construction Safety	2.0
CT 120A	Electrical Wiring	4.0
CT 120B	Commercial Wiring	4.0
Group II - One of the following must be completed:		
CT 107	Technical Math	3.0
CT 108	Advanced Technical Math	3.0

BASIC HEATING, VENTILATION, AIR CONDITIONING AND REFRIGERATION (HVAC/R) SERVICE TECHNICIAN CERTIFICATE OF CAREER PREPARATION

This certificate provides the basic knowledge and skills necessary for job opportunities in heating, ventilation and air conditioning.

Units Required: 17.0		
Group I - All of the following must be completed:		
CT 116	Construction Safety	2.0
CT 122A	Heating and Air Conditioning	4.0
CT 122B	Commercial Refrigeration	4.0
CT 136	HVAC Circuits and Controls	4.0
Group II - One of the following must be completed:		
CT 107	Technical Math	3.0
CT 108	Advanced Technical Math	3.0

PLUMBING TECHNICIAN CERTIFICATE OF CAREER PREPARATION

This certificate provides the necessary knowledge and skill level required for employment in the plumbing industry.

Units Required: 15.0		
Group I - All of the following must be completed:		
CT 113	Uniform Plumbing Code	3.0
CT 116	Construction Safety	2.0
CT 124	Plumbing	4.0
CTMT 121	Plumbing Repair	3.0
Group II - One of the following must be completed:		
CT 107	Technical Math	3.0
CT 108	Advanced Technical Math	3.0

PUBLIC WORKS CERTIFICATE OF ACHIEVEMENT (07569)

This certificate provides the necessary skill level for employment on public works projects. Public works includes construction of streets and highways, water distribution systems, and waste water systems.

Units Required: 18.0 - 19.0	*Students must complete their Construction Technology Certificate plus all the following:*	
Group I - All of the following must be completed:		
CTPW 111	Introduction to Public Works	3.0
CTPW 112	Plan Reading for Public Works	3.0
CTPW 113	Public Works Inspection	3.0
CTPW 114	Public Works Administration	3.0
Group II - Two of the following must be completed:		
CT 123	Surveying	4.0
CTPW 115	Street and Highway Construction	3.0
CTPW 116A	Water Distribution Systems I	3.0
CTPW 117	Portland Cement Concrete	3.0
CTPW 118	Solid Waste Management	3.0
CTPW 119	Wastewater Operations	3.0

BASIC RESIDENTIAL MAINTENANCE TECHNICIAN CERTIFICATE OF CAREER PREPARATION

This certificate provides the necessary knowledge and skill level required for employment in the residential maintenance and repair industry.

Units Required: 15.0		
Group I - All of the following must be completed:		
CT 107	Technical Math **or**	3.0
CT 108	Advanced Technical Math	3.0
CT 116	Construction Safety	2.0
CTMT 120	Residential Maintenance and Repair	4.0
CTMT 121	Plumbing Repair	3.0
CTMT 122	Electrical Repair	3.0

Construction and Manufacturing Technology

BASIC WOODWORKING CERTIFICATE OF CAREER PREPARATION

This certificate demonstrates a basic understanding of wood, joinery and woodworking skills and the ability to safely and appropriately use common hand tools, power tools and equipment to perform common woodworking tasks. This certificate can lead to employment in a wide variety of woodworking trades.

Units Required: 17.0		
Group I - All of the following must be completed:		
CTMF 120A	Woodworking Tools and Equipment	2.0
CTMF 121A	Woodworking	3.0
CTMF 121B	Intermediate Woodworking	3.0
CTMF 122	Advanced Wood Topics	3.0
CTMF 129A	Woodturning	3.0
CTMF 129B	Advanced Woodturning	3.0

RENEWABLE ENERGY CERTIFICATE OF CAREER PREPARATION

This certificate demonstrates an understanding of renewable generation and the effects of fossil fuel use on our environment, economy and society. This certificate can lead to employment in the renewable energy field.

Units Required: 14.0 - 17.0		
Group I - All of the following must be completed:		
CT 105	Technical Sketching	3.0
CT 142	Renewable Energy	3.0
CTMT 122	Electrical Repair	3.0
Group II - One of the following must be completed:		
CT 107	Technical Math	3.0
CT 108	Advanced Technical Math	3.0
Group III - One of the following must be completed:		
CT 143A	Renewable Energy Lab A Photovoltaic	2.0-5.0
CT 143B	Renewable Energy Lab B Solar Thermal	2.0-5.0
CT 143C	Renewable Energy Lab C Wind	2.0-5.0
CT 143D	Renewable Energy Lab D Alternative Fuels	2.0-5.0

BASIC MACHINING CERTIFICATE OF CAREER PREPARATION

This certificate provides the knowledge and basic skills for job opportunities in manufacturing, as well as pre-requisite knowledge and skills for Fabrication and Advanced Manufacturing programs.

Units Required: 16.0		
Group I - All of the following must be completed:		
CIDG 95	Introduction to SolidWorks	3.0
CT 107	Technical Mathematics	3.0
CT 116	Construction Safety	2.0
WELD 58A	Gas Metal Arc Welding Basic	2.0
WELD 58G	Gas Metal Arc Welding Advanced	2.0
WELD 59	Welding Symbols and Blueprint Reading	1.0

CT 60A/B/C/D CONSTRUCTION LABORATORY

Units: 1-4.0 | **48-54 hours laboratory per unit**

(No prerequisites)

A variable unit laboratory class to provide intermediate skill development in the following areas: electrical wiring, finish carpentry, heating and air conditioning, framing, plumbing and concrete and masonry construction. Students will complete contract projects.

CT 90 INTRODUCTION TO CONSTRUCTION

Units: 3.0 *CSU* | **48-54 hours lecture**

(No prerequisites)

A foundational Construction course that prepares students for further Construction education and training. Topics include: tool safety and use, construction drawings, math, safety, and basic employability skills. Students who complete both CT 90 and CT 91 can test to be certified in the Core Curriculum of the National Center for Construction Education and Research, a national construction certification.

CT 91 INTRODUCTION TO CONSTRUCTION

Units: 2.0 *CSU* | **98-108 hours laboratory**

(Corequisites: CT 90)

Lab and skill performance companion to CT 90, prepares students for further Construction education and training. Topics include: tool safety and use,construction drawings, math, safety, and basic employability skills. Students who complete both CT 90 and CT 91 can test to be certified in the Core Curriculum of the National Center for Construction Education and Research, a national construction certification.

CT 101 CAREERS IN CONSTRUCTION AND MANUFACTURING

Units: 1.5 *CSU* | **24-27 hours lecture**

(No prerequisites)

This course is designed to provide the construction, manufacturing and drafting technology student with information and skills necessary to understand current job market needs and prepare a successful educational plan to obtain their desired goals. Students will develop an awareness of occupations and develop skills for seeking employment and completing job applications, resumes and interviews.

CT 103 CONSTRUCTION MANAGEMENT

Units: 3.0 *CSU* | **48-54 hours lecture**

(No prerequisites)

Principles of management as they specifically relate to the construction industry. This course explores the relationship and importance of proper planning, estimating, contracting, financing and building. Also covered are leadership and supervisory skills, employer/employee relationships and safety.

CT 104 CONSTRUCTION LAW

Units: 3.0 *CSU* | **48-54 hours lecture**

(No prerequisites)

Principles of contracting, real estate and construction law. Course includes legal aspects of building codes, contractors' licenses, worker's compensation, social security, state safety regulations and lien laws as they apply to the construction trade.

CT 105 TECHNICAL SKETCHING

Units: 3.0 *CSU* | **32-36 hours lecture and 48-54 hours laboratory**

(No prerequisites)

A course designed to develop sketching skills and introduce sketching techniques currently used in the industrial and architectural fields. Course will include principles of oblique, isometric and perspective sketching, including shading and shadows.

CT 106 MATERIALS OF CONSTRUCTION

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisites)

A study of common materials used in residential and commercial construction. Course includes use and limitations of soil, paving materials, concrete, lumber, wall materials, roofing, insulation, siding, sheet material, electrical and plumbing materials and fixtures. This course will also explore the use of steel, aluminum and plastics in modern construction.

CT 107 TECHNICAL MATHEMATICS

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisites)

A review of basic arithmetic, fractions, decimals and percentages. Introduction to basic algebra and trigonometry as they apply to the manufacturing and construction trades.

CT 108 ADVANCED TECHNICAL MATH

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisites)

This course will include the practical applications of algebra, geometry and trigonometry. Class emphasis will be on the solution of technical problems commonly found in the fields of engineering, drafting, manufacturing and construction.

CT 109 CONSTRUCTION FINANCING

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisites)

This course introduces the basic issues and concepts of construction finance. Course examines the procedures for evaluation of all types of real estate credit and is designed to enable borrowers to utilize their resources to obtain financing.

CT 110 BUILDING CODES AND ZONING

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisites)

Use of the International Building Code and the various related state and local ordinances for plan checking and building compliance. Course includes a basic understanding of building codes and zoning as they apply to the construction and inspection of residential and light commercial buildings.

CT 111A INTERNATIONAL BUILDING CODE I

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisites)

The first of a two part, in-depth study of the contents and applications of the International Building Code and California amendments with emphasis on residential construction. This course includes building classifications by occupancy and type, engineering regulations and design requirements applicable to plan checking and structural building inspection.

CT 111B INTERNATIONAL BUILDING CODE II

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisite. Grade Option.)

A continuing in-depth study of the International Building Code and California amendments with emphasis on commercial applications. Course includes energy conservation standards, specialized commercial structures, public safety and standards for handicapped accessibility.

CT 112 UNIFORM MECHANICAL CODE

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisite)

This class is an in-depth study of the contents and applications of the Uniform Mechanical Code. Course covers the use of this code for plan checks and inspection of residential and commercial structures.

CT 113 UNIFORM PLUMBING CODE

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisite)

This class is an in-depth study of the contents and applications of the Uniform Plumbing Code. Course includes underground and above ground water, gas and air pipe installations for residential and commercial structures.

CT 114 NATIONAL ELECTRICAL CODE

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisite)

This class is an in-depth study of the contents and applications of the National Electrical Code. Course covers the use of the code for plan checks and inspection of residential and commercial structures. Plan reading, electrical theory, wiring methods and installation of electrical components and fixtures are also included.

CT 115 TECHNICAL OFFICE PROCEDURES AND FIELD INSPECTION

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisite)

Office organization, procedures and necessary paper-work pertinent to building and safety office management and inspection. Field inspection for completed building, zoning, health and safety ordinance applications. Course includes several field trips.

CT 116 CONSTRUCTION SAFETY

Units: 2.0 *CSU* **32-36 hours lecture**

(No prerequisite)

Covers OSHA policies, procedures, and standards, as well as safety for general industry and health principles. Topics include scope and application of the OSHA general industry standards. Special emphasis is placed on those areas that are the most hazardous, using OSHA standards as a guide. Upon successful course completion, the student will receive either an OSHA 10 or 30 hour general industry or construction industry training completion card. 36 hours lecture.

CT 119 LOAD CALCULATIONS AND CIRCUIT DESIGN

Units: 3.0 *CSU* **32-36 hours lecture and 48-54 hours laboratory**

(No prerequisite)

This course is designed to develop the skills necessary to visualize and correctly interpret drawings, diagrams, blueprints, and schematics common to the electrical industry. Course includes branch and feeder circuit design and load calculations as they apply to residential, multi-family, commercial and industrial applications.

CT 120A ELECTRICAL WIRING

Units: 4.0 *CSU* **32-36 hours lecture and 96-108 hours laboratory**

(No prerequisite)

Theory, procedure and techniques for electrical wiring of residential and light commercial construction. Topic areas include blueprint reading, power panels, wire sizing, conduit bending and installation, pulling and installation of wires, lighting and plug circuitry, designated circuits, underground and swimming pool wiring.

CT 120B COMMERICAL WIRING

Units: 4.0 *CSU* **32-36 hours lecture and 96-108 hours laboratory**

(Prerequisite: CT 120A)

Learn the techniques necessary for commercial wiring. Size conductors for motor, intermittent and continuous loads. Wire for single and three phase services. Course includes wiring techniques common to commercial applications, running circuits with flex, electrical metallic tubing, rigid and liquid tight conduits and use of common conductors, cables, boxes and raceways. Also included are transformers and motor load calculations, starters and over current protection devices.

CT 121 FINISH CARPENTRY

Units: 4.0 *CSU* **32-36 hours lecture and 96-108 hours laboratory**

(No prerequisite)

Course covers use of hand and machine woodworking tools and techniques common to finish carpentry and cabinet making. Students will develop skill in safe and efficient operation of common tools, layout, cutting, assembly and finish of woodworking projects.

CT 122A HEATING AND AIR CONDITIONING

Units: 4.0 *CSU* **32-36 hours lecture and 96-108 hours laboratory**

(No prerequisite)

This course provides instruction for layout, installation and repair of common residential and light commercial heating and air conditioning systems. Heating and air conditioning theory and energy calculations will be treated in depth. Course also includes use of solar energy for heating and cooling.

CT 122B COMMERCIAL REFRIGERATION

Units: 4.0 *CSU* **32-36 hours lecture and 96-108 hours laboratory**

(Prerequisite: CT 122A)

Explore the more complex commercial and industrial uses of refrigeration, heating and air conditioning. Course covers installation and repair of the most common commercial refrigeration systems found in the food industry and industrial and manufacturing environments. Also included are computer controlled and central plant environmental systems, high and low pressure chillers, cooling towers and air handlers.

CT 122C HEAT PUMP FUNDAMENTALS AND CONTROLS

Units: 4.0 *CSU* **48-54 hours lecture and 48-54 hours laboratory**

(No prerequisite)

This course explores electrical and mechanical circuitry fundamentals, along with theory, operation and application of heat pump systems used in residential and light commercial heating installations including the heat pump refrigeration cycle, reversing valves, defrost methods of supplemental heat, balance point, air flow, and heat pump thermostats.

CT 123 SURVEYING

Units: 4.0 *CSU* **32-36 hours lecture and 96-108 hours laboratory**

(No prerequisite)

A course designed to explore the principles and applications of surveying. Students will develop skill in the operation of surveying equipment used for measuring, leveling and locating of points. Course includes surveying techniques common to building and highway construction, general land surveying, hydrographic surveys and photogrammetric mapping.

CT 124 PLUMBING

Units: 4.0 *CSU* **32-36 hours lecture and 96-108 hours laboratory**

(No prerequisite)

This course provides instruction for layout and installation of residential and light commercial plumbing systems and fixtures. Rough and finish stages of plumbing will be introduced and students will become familiar with reading plans and calculating and constructing the plumbing system.

CT 125 CONCRETE AND MASONRY CONSTRUCTION

Units: 4.0 *CSU* **32-36 hours lecture and 96-108 hours laboratory**

(No prerequisite)

Course covers use of hand and machine tools and techniques common to residential and light commercial concrete and masonry construction. Plan reading, layout, forming, pouring of concrete, tilt-up and various finishing techniques will be introduced. Course also includes construction with brick, stone, concrete block, and other masonry shapes.

CT 126 EXPLORING BRICK AND BLOCK

Units: 1.5 *CSU* **16-18 hours lecture and 24-27 hours laboratory**

(No prerequisite. Grade Option)

This course includes techniques used for construction of brick and block walls, decorative brick patios, planter edging and concrete slabs, curbs and walks. Class covers information on concrete and mortar mixes and proper forming, pouring and finishing of concrete slab and wall footings.

CT 127 FRAMING

Units: 4.0 *CSU* **32-36 hours lecture and 96-108 hours laboratory**

(No prerequisite)

Course covers use of hand and machine tools and techniques common to rough carpentry and residential and light commercial framing. Students will develop skill in safe and efficient operation of common tools, layout techniques, cutting and assembly of wall, ceiling and roof framing, and installing sheathing and insulation.

CT 129 INDEPENDENT STUDY

See Independent Study listing (1-4 units). *CSU*

CT 130 RESIDENTIAL REMODELING

Units: 3.0 *CSU* **32-36 hours lecture and 48-54 hours laboratory**

(No prerequisite. Grade Option)

Learn the skills and techniques necessary for remodeling of residential structures. Course includes project planning, estimation and layout. Gain experience in framing, plumbing, electrical drywall, floor and wall finishing and concrete with projects that include patio and deck construction, room additions and kitchen and bathroom remodeling.

CT 131 MICROCOMPUTERS IN CONSTRUCTION

Units: 4.0 *CSU* **48-54 hours lecture and 48-54 hours laboratory**

(No prerequisite)

This course is designed to introduce the student to the potentials of the computer as it directly applies to the construction industry. Course includes instruction and practice in the following common program types: operating system, word processing, presentation, spreadsheet, email, web-page design, publishing estimation, and introductory computer-aided drafting.

CT 132 CONSTRUCTION ESTIMATION

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisite)

Learn how to bid accurately and profitably. Course will teach you how to account for materials, labor, taxes, insurance, overhead, and profits across various trades in preparing winning estimates. Speed up your estimating process and increase your accuracy using today's leading construction estimation software. Estimating software allows take-offs using quick, single and assembly methods to meet your particular estimating needs.

CT 133 PRECISION ESTIMATION

Units: 3.0 *CSU* **32-36 hours lecture and 32-36 hours by arrangement**

(No prerequisite)

Learn how to speed up your estimating process and increase your accuracy using today's leading construction estimating software. Estimating software allows take-off using quick, single and assembly methods. Course includes development and maintenance of your database. Create your own crews, add-ons, formulas and assemblies to meet your particular estimating needs.

CT 136 HVAC CIRCUITS AND CONTROLS

Units: 4.0 *CSU* **48-54 hours lecture and 48-54 hours laboratory**

(No prerequisite)

This course explores electrical fundamentals common to the heating, ventilation, air conditioning and refrigeration fields. Course includes electrical theory, control circuitry and electronics, system supply circuitry and alternating and direct current troubleshooting.

CT 137 SHEET METAL FABRICATION

Units: 3.0 *CSU* **32-36 hours lecture and 48-54 hours laboratory**

(No prerequisite)

This course will introduce the student to the fundamental elements, methods and principals of sheet metal design, fabrication and installation. Course includes air handling systems, gutters, flashings, coping, tanks and exhaust systems. Students will gain valuable hands-on skills in the proper use of metal working hand and machine tools through the completion of multiple projects.

CT 138 COOPERATIVE EDUCATION

See Cooperative Education listing (1-8 units) *CSU*

CT 140 CONSTRUCTION INTERNSHIP

Units: 4.0 *CSU* **64-72 hours lecture**

(No prerequisite. Grade Option)

Gain valuable hands-on construction skills by participating in the creation and operation of a small construction business. Students will research the market, design the project, estimate the costs, develop a business plan, secure a construction loan, prepare a schedule and analyze the projects progress and perform customer service and sales.

CT 141 CONSTRUCTION INTERNSHIP LABORATORY

Units: 2-12.0 *CSU* **6 hours weekly by arrangement per unit**

(No prerequisite. Co-requisite: CT 140. Grade Option)

This course is the laboratory component for CT 140 Construction Internship. Students will research, develop, construct and market a construction project using computers and common construction tools and equipment.

CT 142 RENEWABLE ENERGY FUNDAMENTALS

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisite.)

This course explores methods of generation and use of renewable energy. Topics include renewable fuel based generators, fuel cells, wave and tidal generation, geothermal, wind turbines, photovoltaic, barometric pressure, and hydroelectric generation. Course also covers active and passive solar heating and cooling, alternate fuel vehicles and electric transportation.

CT 143A RENEWABLE ENERGY LAB A: PHOTOVOLTAIC

Units: 2-5.0 *CSU* **16-18 hours lecture and 48-54 hours per unit of laboratory per term**

(Prerequisite/Co-requisite: CT 142)

This course explores using photovoltaic technology to generate electricity for various applications: residential, remote, portable, auxiliary, or mobile.

CT 143B RENEWABLE ENERGY LAB B: SOLAR THERMAL

Units: 2-5.0 *CSU* **16-18 hours lecture and 48-54 hours per unit of laboratory per term**

(Prerequisite/Co-requisite: CT 142)

This course explores using solar thermal technology for various applications including passive/active heating/cooling and generating electricity.

CT 143C RENEWABLE ENERGY LAB C: WIND

Units: 2-5.0 *CSU* **16-18 hours lecture and 48-54 hours per unit of laboratory per term**

(Prerequisite/Co-requisite: CT 142)

This course explores renewable energy with a focus on wind electrical generation through the completion of actual projects.

CT 143D RENEWABLE ENERGY LAB D: ALTERNATIVE FUELS

Units: 2-5.0 *CSU* **16-18 hours lecture and 48-54 hours per unit of laboratory per term**

(Prerequisite/Co-requisite: CT 142)

This course explores using alternative fuels for transportation, heating systems, and generating electricity through the construction of an actual project.

CT 144 PHOTOVOLTAIC SYSTEMS AND INSTALLATION

Units: 6.0 *CSU* **64-72 hours lecture and 96-108 hours laboratory**

(No prerequisite)

This course will prepare students for a career in the Residential Solar Industry. At the conclusion of the course, students may take the national entry-level NABCEP Certification Exam. Students will explore photovoltaic energy and systems, and the methods used to install residential systems. System components, building code requirements, system sizing and design, and solar energy principles will be examined extensively. During lab hours, students will conduct experiments that demonstrate the principles of photovoltaic and electrical systems. Students will design, safely install, and trouble-shoot systems on actual buildings and ground mounts.

CT 148 SPECIAL TOPICS

See Special Topics listing (Variable units) *CSU*

Construction Technology Manufacturing Courses

CTMF 50 GENERAL MACHINE SHOP

Units: 3.0 *CSU* **16-18 hours lecture and 96-108 hours laboratory**

(No prerequisite)

This introductory course instructs students in the basic set up and operation of the lathe, mill, saw, drill press, and grinder. Safety, blueprint reading, measurement, shop math, tool grinding, and speed & feed calculations also included.

CTMF 120A WOODWORKING TOOLS AND EQUIPMENT

Units: 2.0 *CSU* **32-36 hours lecture**

(No prerequisite)

This course is designed to give the woodworking student an in-depth knowledge of common woodworking tools and equipment. Students will explore the safety, use and maintenance of saws, lathes, routers, planers, jointers, sanders and common power and hand tools used for basic woodworking projects.

CTMF 120B ADVANCED WOODWORKING TOOLS AND EQUIPMENT

Units: 2.0 *CSU* **32-36 hours lecture**

(Prerequisite: CTMF 120A.)

This course is designed to give the woodworking student an in-depth knowledge of the more advanced woodworking tools, equipment and operations. Students will explore the safety, setup, use and maintenance of saws, lathes, routers, planers, jointers, sanders and common power and hand tools as used in advanced woodworking projects. Course also includes extensive coverage of tool sharpening.

Construction Technology Manufacturing Courses

CTMF 121A WOODWORKING

Units: 3.0 *CSU* **32-36 hours lecture and 48-54 hours laboratory**

(No prerequisite)

This is a beginning woodworking class. Topics covered include safety, tools, the composition of wood and its characteristics, beginning design and sketching, project planning, measuring and cutting, use of large and small power tools, and general woodworking techniques. Students will be expected to complete multiple projects as part of their grade.

CTMF 121B INTERMEDIATE WOODWORKING

Units: 3.0 *CSU* **32-36 hours lecture and 48-54 hours laboratory**

(Prerequisite: CTMF 121A)

This is an intermediate woodworking class. Topics include safety, tools, the composition of wood and its characteristics, finishing, intermediate design and sketching, and project planning. Students will generate shop drawings adequate to build the project. Students will measure, cut, and use power tools and general woodworking techniques.

CTMF 121C ADVANCE WOODWORKING

Units: 3.0 *CSU* **32-36 hours lecture and 48-54 hours laboratory**

(Prerequisite: CTMF 121B with a grade of "C" or better)

This is an advanced course in fine woodworking using techniques common to custom wood products, furniture making and wood art. Learn the artisan's techniques for wood joining, carving, turning and finishing by completing various wood projects. Course includes a study of common woods, tools and methods for shaping and finishing.

CTMF 122 ADVANCED WOOD TOPICS

Units: 3.0 *CSU* **32-36 hours lecture and 48-54 hours laboratory**

(Prerequisite: CTMF 121A Basic Woodworking. Grade Option)

Come develop your skills and learn the methods and procedures necessary for completing an advanced woodworking project. One specific advanced woodworking project is selected as the focus for each semester. Check with the Construction Technology Department for the current project. Course may also include specialized techniques of turning, marquetry, parquetry, carving and intarsia.

CTMF 127 PRODUCTION WOODWORKING

Units: 3.0 *CSU* **32-36 hours lecture and 48-54 hours laboratory**

Prerequisite: CTMF 121A)

This course covers techniques common to production woodworking and includes design and construction of custom jigs, fixtures and templates for drill presses, routers, saws and lathes. Students will gain experience with computer numerical controlled routers, surfacing sanders, airbag sanders and production fastening techniques and wood finishes while creating several commercial woodworking projects.

CTMF 129A WOODTURNING

Units: 3.0 *CSU* **32-36 hours lecture and 48-54 hours laboratory**

CSU (Prerequisite: CTMF 120A)

This introductory course will provide the woodworking student with information and skills necessary to successfully design, turn and finish typical woodturning projects. Course includes lathe, spindle, faceplate and drive chuck turning. Students will complete a variety of projects that can include pens and pencils, games and toy pieces, decorations, lamps, spindles, bowls and boxes.

CTMF 129B ADVANCED WOODTURNING

Units: 3.0 *CSU* **32-36 hours lecture and 48-54 hours laboratory**

(Prerequisite: CTMF 129A. Grade Option)

This advanced woodturning course includes green, seasoned and laminated wood and acrylic projects. Students will explore turning of large bowls and platters, maintaining natural edges, turning burls, proper box and lid construction, off center turning, chatter finishes and construction of turning fixtures, centers and drives.

CTMF 130A MECHANICAL DESKTOP

Units: 3.0 *CSU* **32-36 hours lecture and 32-36 hours by arrangement**

(No prerequisite. Grade Option.)

Develop your skill in creating accurate three-dimensional parametric models using Mechanical Desktop. Explore the exciting features of this program which includes parametric modeling, surfacing, model analysis, interference checking and assemblies. Learn how to export surface and design information to computer controlled mills and routers. This is an introductory class in Mechanical Desktop.

CTMF 130B MECHANICAL DESKTOP ADVANCED

Units: 3.0 *CSU* **32-36 hours lecture and 32-36 hours by arrangement**

(Prerequisite: CTMF 130A)

This advanced course in Mechanical Desktop includes a focused exploration of detailed models and complex assembly models. Students will explore the full features of the Mechanical Desktop package including fasteners, shaft and gear generation and creation of motion based, skin and derived surfaces. Both localized and externalized assemblies will be created and analyzed for interference and engineering characteristics.

CTMF 131A COMPUTER AIDED MANUFACTURING (CAM) SOFTWARE

Units: 3.0 *CSU* **16-18 hours lecture and 96-108 hours laboratory**

(No prerequisite)

Learn the techniques of numerical controlled programming using Computer-Aided Manufacturing (CAM) software. Generate three-dimensional models and learn how to create parts, molds, and fixtures using integrated solids, surfaces and wireframes. Unite the software with the machine and create milled or routed three-dimensional parts.

CTMF 131B COMPUTER AIDED MANUFACTURING (CAM) SOFTWARE ADVANCED

Units: 3.0 *CSU* **16-18 hours lecture and 96-108 hours laboratory**

(Prerequisite: CTMF 131A.)

This advanced course includes an in-depth study of the more complex features of Computer-Aided Manufacturing (CAM) software. Students will create geometry and toolpaths for complex three-dimensional and surface models for mills, routers, lathes and engraving machines. Programming of multi-axis and mill-turn machines will be explored.

CTMF 140 MANUFACTURING INTERNSHIP

Units: 1.0 *CSU* **48-54 hours laboratory**

(No prerequisite. Grade Option)

This course will provide the construction, drafting and manufacturing technology student with hands-on job skills and experience common to the manufacturing industry.

CTMF 141 MANUFACTURING INTERNSHIP LABORATORY

Units: 2.0 *CSU* **96-108 hours laboratory**

(Corequisite: CTMF 140. Grade Option- Student makes choice of letter grade or Pass/No Pass)

This course is the laboratory component for CTMF 140 Manufacturing Internship. Students will research, design, manufacture and market a project using computers and common manufacturing equipment. CTMF 140 must be taken concurrently.

Construction Technology Maintenance Courses

CTMT 120 RESIDENTIAL MAINTENANCE AND REPAIR

Units: 4.0 *CSU* **48-54 hours lecture and 48-54 hours laboratory**

(No prerequisite. Grade Option)

This class covers all major aspects of preventative maintenance and repair for residential and light commercial buildings. Topics covered include but are not limited to repairing roofing, plumbing, electrical framing, insulation, drywall, painting, concrete, flooring, safety, tools, heating and cooling, etc. as they apply to the maintenance and repair industry.

Construction Technology Maintenance Courses

CTMT 121 PLUMBING REPAIR

Units: 3.0 *CSU* **32-36 hours lecture and 48-54 hours laboratory**

(No prerequisite. Grade Option)

This class covers most aspects of residential and light commercial plumbing repair. Topics covered include but are not limited to plumbing tools, water supply systems, drainage systems, drainage problems, faucets and valves, piping, soldering and threading, water heating systems, plumbing fixtures, pricing, billing, and inventory management, as they apply to the plumbing repair business.

CTMT 122 ELECTRICAL REPAIR

Units: 3.0 *CSU* **32-36 hours lecture and 48-54 hours laboratory**

(No prerequisite. Grade Option)

This class covers most aspects of residential and light commercial electrical repair. Topics covered included but are not limited to electrical tools, electrical theory, wiring systems electrical materials, electrical services, troubleshooting electric circuits, low voltage circuits, appliances and motors, and mathematics for electricians.

CTMT 123 CUSTODIAL MAINTENANCE

Units: 4.0 *CSU* **48-54 hours lecture and 48-54 hours laboratory**

(No prerequisite. Grade Option)

This course covers the major aspects of custodial and janitorial work. Course includes general cleaning techniques, cleaning equipment use and maintenance, cleaning chemicals, window care, maintaining hard floors, carpet and upholstery care, chemical hazards, Cal OSHA regulations, and handling of infectious waste as they apply to the janitorial industry.

Construction Technology Public Works Courses

CTPW 111 INTRODUCTION TO PUBLIC WORKS

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisite)

Introduction to techniques, materials and equipment used in Public Works maintenance and construction. Meets the standards of the American Public Works Association, Street Superintendents' Association and Inspectors' Association.

CTPW 112 PLAN READING FOR PUBLIC WORKS

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisite)

Reading and interpreting plans related to public works, water, storm drain, and sewage facility projects. Basic survey methods, symbols, mathematical conversions, and determination of slope and grade.

CTPW 113 PUBLIC WORKS INSPECTION

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisite)

General public works inspection techniques. Includes Portland Cement and asphalt concretes, soils, base and subgrade, safety, contracts, and specifications. Responsibilities of the contractor, engineer, agency, and inspector.

CTPW 114 PUBLIC WORKS ADMINISTRATION

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisite)

An introduction to the organizational concepts used by the Public Works department. Includes typical organization, management concepts, political considerations, planning, budget management and public relations.

CTPW 115 STREET AND HIGHWAY CONSTRUCTION

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisite)

Equipment, materials, and methods employed in the construction, inspection, and maintenance of streets and highways. Includes Portland Cement concrete; surface drainage; traffic signs; safety and safe practices, highway design; laws, codes and ordinances; management principles; budget preparations; equipment maintenance records; underground utilities; surveying and staking.

CTPW 116A WATER DISTRIBUTION SYSTEMS I

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisite)

Water distribution systems operation. Fundamentals of water production, quality, and system operation. Includes piping, services, pumps, reservoirs, mathematics, and basic hydraulics. Preparation for Grades I and II Water Distribution Operator Certification.

CTPW 117 PORTLAND CEMENT CONCRETE

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisite)

Portland Cement concrete design and uses. Covers transporting, placing, curing, and testing Portland Cement concrete. Applications and construction methods employed.

CTPW 118 SOLID WASTE MANAGEMENT

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisite)

Methods used in collection of solid waste materials. Includes equipment, scheduling, and customer relations. Ultimate disposal of solid waste matter as well as projections concerning future collection and disposal operations. Special emphasis on municipal resource recovery, salvaging, and recycling.

CTPW 119 WASTEWATER OPERATIONS

Units: 3.0 *CSU* **48-54 hours lecture**

(No prerequisite)

Comprehensive examination of wastewater operations, impact of waste contributions from home and industry, effects of wastewater treatment, water reclamation and by-product disposal.