

# BUILDING INDUSTRIES

## Contact Information

### Division

Business and Technology

### Dean

Amy Schulz

### Associate Deans

Jill Alcorn, Vance Klinke

### Division Office

B 3, Rocklin Campus

## Overview

Building Industries curriculum includes job safety, construction skills, work ethics, and hands-on laboratory courses to provide trade related skills such as electrical, plumbing, carpentry, and photovoltaics. The program provides foundational training for building industries and construction management programs as well as training for entry-level employment in construction fields.

## Faculty

### Louie Garcia

#### Professor, Building Industries

B.S., University of Phoenix

M.B.A., University of Phoenix

## Building Industries Advisory Committee

- Burne Engineering Services Inc., El Dorado Hills, CA
- Golden Sierra Job Training Agency, Roseville, CA
- LB Construction Inc., Roseville, CA
- North State Building Industry Association, Roseville, CA
- PHCC of California, Sacramento, CA
- Roseville Union High School District, Roseville, CA

## Degrees/Certificates

### Associate Degrees

Construction Management (p. 1)

Drafting Architectural/Civil (p. 1)

### Certificate of Achievement

Drafting Architectural/Civil (p. 2)

### Skills Certificates

Architectural Drafting Specialist (p. 2)

Construction Basics (p. 2)

### Noncredit Certificates

Construction Fundamentals (p. 2)

Energy Surveying and Lighting Retrofits (p. 3)

## Construction Management

### AS Degree

The curriculum in Construction Management focuses on providing a broad base of knowledge and skills targeted toward the management

of construction operations. The objective of the degree is to provide a foundation for continued study in construction management at a four-year college or university or for employment in the construction industry.

The program is oriented toward the practical problems of the construction industry and the curriculum emphasizes subject areas that provide a basis for employment in the industry including business, mathematics and foundational construction courses. Students completing the Construction Management program will find a wide variety of career choices including estimator, construction manager, construction owner, and project manager. For the degree, students must fulfill the following major requirements with grades of "C" or better, complete a minimum of 60 degree-applicable semester units (12 of which must be completed at Sierra College) with a grade point average of at least 2.0, and complete one of the following three general education patterns:

- Sierra College Associate Degree Requirements (<http://catalog.sierracollege.edu/student-resources/general-education/associate-degree-requirements/>);
- California State University General Education Breadth (<http://catalog.sierracollege.edu/student-resources/general-education/california-state-university-general-education-breadth-requirements/>) pattern;
- Intersegmental General Education Transfer Curriculum (IGETC) (<http://catalog.sierracollege.edu/student-resources/general-education/intersegmental-general-education-transfer-curriculum-igetc/>).

## Required Courses

Code	Title	Units
BI 0001	OSHA Construction Safety Training	1
BI 0005	Introduction to the Built Environment	3
BI 0006	Introduction to Construction Management	3
BI 0020	Foundations and Framing	3
BI 0022	Introduction to Energy Efficiency Construction	3
BUS 0201	Financial Accounting I	3
BUS 0202	Financial Accounting II	3
BUS 0203	Managerial Accounting	3
ECON 0001A	Principles of Macroeconomics	3
ECON 0001B	Principles of Microeconomics	3
MATH 0016A	Calculus for Social and Life Sciences	4
or MATH 0030	Analytical Geometry and Calculus I	
PHYS 0105	General Physics I	4
PHYS 0105L	General Physics I Laboratory	1
<b>Total Units</b>		<b>37</b>

## Drafting Architectural/Civil

### AA or AS Degree

Successful completion of the curriculum in Drafting Architectural/Civil prepares students for entry-level positions as document support technicians in the fields of architecture, interior design and kitchen/bath design. For the degree, students must fulfill the following major requirements with grades of "C" or better, complete a minimum of 60 degree-applicable semester units (12 of which must be completed at Sierra College) with a grade point average of at least 2.0 and complete one of the following three general education patterns:

- Sierra College Associate Degree Requirements (<http://catalog.sierracollege.edu/student-resources/general-education/associate-degree-requirements/>);
- California State University General Education Breadth (<http://catalog.sierracollege.edu/student-resources/general-education/california-state-university-general-education-breadth-requirements/>);
- Intersegmental General Education Transfer Curriculum (IGETC) (<http://catalog.sierracollege.edu/student-resources/general-education/intersegmental-general-education-transfer-curriculum-igetc/>).

**Required Courses**

Code	Title	Units
BI 0008	Civil Applications of Computer-Aided Design	3
BI 0010	Architectural Drawing I	3
BI 0011	Architectural Drawing II	3
BI 0012	Architectural Drawing III-BIM (Building Information Modeling)	3
BI 0015	Managing the Computer-Aided Design (CAD) Environment	3
BI 0022	Introduction to Energy Efficiency Construction	3
BI 0024	Fundamentals of Construction Documents and Estimating	3
BI 0095	Internship in Building Industries	0.5-4
<b>Total Units</b>		<b>21.5-25</b>

**Optional Recommended Electives:**

Code	Title	Units
BI 0020	Foundations and Framing	
BI 0026	Residential House Wiring and Codes	
BI 0032	Residential Building Codes	
BI 0034	Plumbing and Mechanical Installation and Design	
ENGR 0180	Engineering Surveying	

**Drafting Architectural/Civil****Certificate of Achievement**

Successful completion of the curriculum in Drafting Architectural/Civil prepares students for entry-level positions as document support technicians in the fields of architecture, interior design and kitchen/bath design. A certificate is designed to provide career technical skills; it is not equivalent to an associate degree.

**Required Courses**

Code	Title	Units
BI 0008	Civil Applications of Computer-Aided Design	3
BI 0010	Architectural Drawing I	3
BI 0011	Architectural Drawing II	3
BI 0012	Architectural Drawing III-BIM (Building Information Modeling)	3
BI 0015	Managing the Computer-Aided Design (CAD) Environment	3

BI 0022	Introduction to Energy Efficiency Construction	3
BI 0024	Fundamentals of Construction Documents and Estimating	3
BI 0095	Internship in Building Industries	0.5-4
<b>Total Units</b>		<b>21.5-25</b>

**Optional Recommended Electives:**

Code	Title	Units
BI 0020	Foundations and Framing	
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BI 0032	Residential Building Codes	
BI 0034	Plumbing and Mechanical Installation and Design	
ENGR 0180	Engineering Surveying	

**Architectural Drafting Specialist****Skills Certificate**

Designed to give students the drafting support knowledge and abilities required to enter the workforce at the specialist level. Focuses on skills relative to specialized architectural documentation such as is used in architectural and civil construction trades. Appropriate for students seeking retraining. This is a specialty skills certificate designed to provide career technical skills; it is not equivalent to an associate degree.

**Required Courses**

Code	Title	Units
BI 0008	Civil Applications of Computer-Aided Design	3
or BI 0022	Introduction to Energy Efficiency Construction	
BI 0010	Architectural Drawing I	3
BI 0011	Architectural Drawing II	3
BI 0012	Architectural Drawing III-BIM (Building Information Modeling)	3
<b>Total Units</b>		<b>12</b>

**Construction Basics****Skills Certificate**

The Construction Basics Skills Certificate curriculum prepares students to work safely for small to large home builders in a labor role. This skills certificate provides a foundation for students to help employers directly build residential homes. A skills certificate is designed to provide career technical skills; it is not equivalent to an associate degree.

**Required Courses**

Code	Title	Units
BI 0001	OSHA Construction Safety Training	1
BI 0003	Introduction to Construction and CNC Woodworking	3
BI 0005	Introduction to the Built Environment	3
<b>Total Units</b>		<b>7</b>

**Construction Fundamentals****Noncredit Certificate of Completion**

The Construction Fundamentals certificate of completion provides the essential skills and workforce preparation needed for entry level careers

in the building trades and construction industry. Students will gain knowledge and skills interpreting technical trade calculations, taking accurate measurements, blueprint reading, handling equipment and materials, basic building and installation methods and practicing safety construction techniques according to Occupational Safety and Health Administration (OSHA) standards.

#### Required Courses:

Code	Title	Units
BI 0805	Introduction to Industry and Occupational Safety for the Building Trade	0
BI 0806	Introduction to Building Trades and Tools	0
BI 0807	Basic Material Handling and Building	0
<b>Total Units</b>		<b>0</b>

## Energy Surveying and Lighting Retrofits

### Noncredit Certificate of Completion

The Construction and Energy Technology noncredit Certificate of Completion prepares students to work for businesses in residential and commercial energy auditing, electrical wiring and commercial lighting retrofit trade industries.

#### Required Courses

Code	Title	Units
BI 0800	Introduction to Energy Surveying	0
BI 0801	Basic Electricity and Wiring Fundamentals	0
BI 0802	Introduction to Lighting Retrofits	0
<b>Total Units</b>		<b>0</b>

## Courses

Understanding course descriptions (<http://catalog.sierracollege.edu/student-resources/course-information/understanding-course-descriptions/>)

### BI 0001. OSHA Construction Safety Training

*Unit: 1*

Formerly known as CET 1

Hours: 18 lecture

Covers a variety of construction safety and health hazards workers may encounter. Provides safety information to construction workers about employee and employer rights and responsibilities. Emphasizes identification, avoidance, abatement, control, and prevention of job-related hazards on construction sites. This course is taught by authorized industry outreach trainers, and upon successful completion, students will receive the OSHA 10 Hour card. (not transferable)

### BI 0002. OSHA 30-Hour Construction Safety Training

*Units: 2*

Hours: 36 lecture

Covers specific OSHA requirements as they apply to the construction industry and teaches safety awareness to help recognize and reduce the risks of job site hazards. This course is an orientation and covers safety and health hazards workers may face on construction work sites with emphasis on hazard identification, avoidance, control and prevention and is intended for supervisors or workers who have some safety responsibility. Upon successful completion, 30 hour OSHA card issued by instructor. (not transferable)

### BI 0003. Introduction to Construction and CNC Woodworking

*Units: 3*

Formerly known as CET 3

Advisory: Completion with grade of "C" or better or concurrent enrollment in BI 1

Hours: 108 (36 lecture, 72 laboratory)

Designed to teach the skills required to be successful in the construction and woodworking industries. Topics include fundamentals of woodworking, safe operation of hand tools, introduction to wood CNC manufacturing, project drawings, and environmentally sound design and construction techniques. Hands-on experience with construction and woodworking tools and materials based on assigned student project(s). (not transferable)

### BI 0005. Introduction to the Built Environment

*Units: 3*

Formerly known as CET 5

Hours: 54 lecture

Introduction to the building industry: trends, organizations, construction processes, contracting laws, regulations, business aspects and career pathways. (CSU)

### BI 0006. Introduction to Construction Management

*Units: 3*

Prerequisite: Completion of BI 5 with grade of "C" or better

Hours: 54 lecture

Introduction to Construction Management. Topics are based on learning outcomes from the American Council for Construction Education (ACCE). This course introduces the structure of construction estimation, financing, and proper planning. (CSU)

### BI 0007. Building with Green Construction Materials

*Units: 4*

Formerly known as CET 7

Advisory: Completion with grade of "C" or better or concurrent enrollment in BI 1

Hours: 180 (18 lecture, 162 laboratory)

Project-based study of the performance characteristics of building materials using sustainable construction techniques and materials. Includes the basic properties and installation techniques of metals, aggregates, cement products, asphalt products and wood. Safe handling of construction materials and tools. (CSU)

**BI 0008. Civil Applications of Computer-Aided Design***Units: 3*

Formerly known as DES 10

Prerequisite: Completion of ADVM 2 or BI 10 with grade of "C" or better or equivalent as determined by instructor

Hours: 90 (36 lecture; 54 laboratory which may be scheduled TBA)

Development of drafting skills used in the areas of industrial and civil engineering support. Emphasis on land division, determination of location and direction, development of plots based upon legal description and the fundamentals of utilizing surveying data as applied to preliminary and final maps. Designed for students who have attained an intermediate knowledge of the processes and practices of engineering design/drafting support. Introduction to AutoCAD Civil 3D software. (CSU)

**BI 0010. Architectural Drawing I***Units: 3*

Formerly known as DES 20

Hours: 90 (36 lecture; 54 laboratory which may be scheduled TBA)

Introduction to the fundamentals of residential construction and design documentation. Drawings of a residence are developed and detailed, to include sketches, site plan and floor plans, foundation, elevations, and section views. AutoCAD instruction is incorporated to develop CAD drawings and electronic data sets. (CSU)

**BI 0011. Architectural Drawing II***Units: 3*

Formerly known as DES 21

Prerequisite: Completion of BI 10 with grade of "C" or better or equivalent as determined by instructor

Hours: 90 (36 lecture; 54 laboratory which may be scheduled TBA)

Advances the skills and knowledge of residential architectural drawing production started in BI 10. Course focuses on production of residential architectural drawings of a 2-story wood framed house in the context of current and relevant building codes, construction materials and methods, industry standard work flow, production and graphic standards through the use of a drawing software application. Additional skills of software utilization, drawing management, complex drawing creation and printing will be covered. This course teaches intermediate AutoCAD skills. (CSU)

**BI 0012. Architectural Drawing III-BIM (Building Information Modeling)***Units: 3*

Formerly known as DES 22

Prerequisite: Completion of BI 11 with grade of "C" or better or equivalent as determined by instructor

Hours: 90 (36 lecture; 54 laboratory which may be scheduled TBA)

Continuation of the architectural design started in BI 10 and 11. Students utilize Building Information Modeling (BIM) using REVIT software to develop commercial architectural documentation (including electronic data sets) in adherence to the International Building Code (IBC) and local county and state codes. (CSU)

**BI 0015. Managing the Computer-Aided Design (CAD) Environment***Units: 3*

Formerly known as DES 40

Prerequisite: Completion of BI 8, ADVM 11 or BI 12 with grade of "C" or better, or equivalent as determined by instructor

Advisory: Completion of ADVM 3D with grade of "C" or better

Hours: 90 (36 lecture; 54 laboratory which may be scheduled TBA)

Designed for the advanced Drafting and Engineering Support student. Topics include proper CAD management skills and the development of "as built" models used in the manufacturing, architectural and civil disciplines. Focus on utilizing, creating and instituting CAD standards, policies and procedures. Development of prototypes integral to the design process in their chosen area of concentration (mechanical, civil and/or architecture). (CSU)

**BI 0020. Foundations and Framing***Units: 3*

Formerly known as CET 20

Hours: 108 (36 lecture, 72 laboratory)

Fundamentals of construction foundation and framing techniques involving layout and construction to include, establishing elevations, site preparation, types of foundation forms, rebar and bolt installation, concrete placement techniques for slab on grade, cast in place (CIP), and pre-cast installations, structural steel, various types of floor systems, and applicable code requirements specific to the above. Introduction to California Green Technology and "Net Zero Energy" policies and sustainability practices for residential, commercial, and industrial construction. (CSU)

**BI 0022. Introduction to Energy Efficiency Construction***Units: 3*

Formerly known as CET 22

Hours: 108 (36 lecture, 72 laboratory)

Fundamentals of residential, commercial, and industrial framing techniques to include interior and exterior walls, ceilings, roof systems, stair design, installation and placement of sub trades including dry mechanical, plumbing, electrical, and structural steel post and beam installations. Introduction the future of construction as it evolves utilizing California Green Technology, "Net Zero Energy" policies, and sustainability practices. (CSU)

**BI 0024. Fundamentals of Construction Documents and Estimating***Units: 3*

Formerly known as CET 24

Hours: 54 lecture

Establishes a vocabulary and understanding of construction related documents including the symbols and detail views of building plans. Cost estimating to include material and labor cost calculations, specifications, problem solving, and bid preparations. (CSU)

**BI 0026. Residential House Wiring and Codes***Units: 3*

Formerly known as CET 26

Hours: 108 (36 lecture, 72 laboratory)

Introduction in the electrical trade. Inside wiring as applied to residential, commercial, and industrial structures. Electrical service requirements for photovoltaic systems. Use of tools and materials of the trade. Review of the National Electrical Code and the applications and California Electrical Code updates to the California Green Technology and "Net Zero Energy" policies. (CSU)

**BI 0028. Independent Study***Units: 1-3*

Formerly known as CET 28

Designed for students interested in furthering their knowledge at an independent study level in an area where no specific curriculum offering is currently available. Independent study might include, but is not limited to, research papers, special subject area projects, and research projects. See Independent Study page in catalog. (CSU)

**BI 0030. Finish Carpentry***Units: 3*

Formerly known as CET 30

Advisory: Completion with grade of "C" or better or concurrent enrollment in BI 3

Hours: 108 (36 lecture, 72 laboratory)

Fundamentals of woodworking hand tools, power hand tools and woodworking machinery to safely develop knowledge and skills leading to finish trim carpentry. Emphasis on residential construction finish carpentry standards, details, nomenclature, trims, and methods of setting interior and exterior doors, window jamb and trims, closet packs, cabinet installs, wainscoting, stair trim and railings, base and ceiling trims and finished flooring applications. (not transferable)

**BI 0032. Residential Building Codes***Units: 3*

Formerly known as CET 32

Hours: 54 lecture

Instruction in building codes for light frame one- or two-story dwellings related to local jurisdictions and the State of California. Application of codes to existing buildings with a study of regulations and abatement procedures for standard frame and Insulated Concrete Forms (ICF) green technology buildings. Includes codes related to California Green Technology and "Net Zero Energy" policies. (not transferable)

**BI 0034. Plumbing and Mechanical Installation and Design***Units: 3*

Formerly known as CET 34

Hours: 108 (36 lecture, 72 laboratory)

Introduction to the planning, installing, and maintaining of mechanical (HVAC/R) and plumbing systems in accordance with local codes and ordinances. Includes use of materials and codes related to California Green Technology and "Net Zero Energy" policies. (CSU)

**BI 0095. Internship in Building Industries***Units: 0.5-4*

Formerly known as CET 95

Designed for advanced students to work in an area related to their educational or occupational goal. Provides new on-the-job technical training under the direction of a worksite supervisor, allowing students to expand knowledge and skills in the chosen field. Mandatory orientation session and faculty approval to determine eligibility. One unit of credit is equal to 54 hours of work. Students may earn up to a total of 16 units in internship courses (any course numbered 95 and PDEV 94). (CSU)

**BI 0800. Introduction to Energy Surveying***Units: 0*

Formerly known as CET 800

Prerequisite: Completion of BI 1 with grade of "C" or better, or equivalent as determined by the program chair

Hours: 40 (24 lecture, 16 laboratory)

Competency-based course of instruction designed to align with the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) Level-1 energy auditing standards. Provides hands-on experience in residential and commercial energy auditing. Emphasis on principles and sources of energy, detailed facilities evaluation techniques, data collection for energy auditing, establishing baselines, and conducting accurate inventories. Includes workplace safety policies and practices to comply with OSHA guidelines. Students required to secure personal protective equipment as of first class session. (pass/no pass grading) (noncredit)

**BI 0801. Basic Electricity and Wiring Fundamentals***Units: 0*

Formerly known as CET 801

Prerequisite: Completion of BI 800 with grade of "Pass"

Hours: 40 (20 lecture, 20 laboratory)

This comprehensive introduction to electrical wiring provides a well-rounded understanding of the fundamentals of basic electricity, electrical safety, electrical circuitry, and the processes and procedures of the electrical wiring trades. Includes relevant electrical codes. Students required to secure personal protective equipment as of first class session. (pass/no pass grading) (noncredit)

**BI 0802. Introduction to Lighting Retrofits***Units: 0*

Formerly known as CET 802

Prerequisite: Completion of BI 801 with grade of "Pass"

Hours: 40 (20 lecture, 20 laboratory)

Provides well-rounded competency-based understanding of lighting retrofit trade fundamentals through hands-on experience in commercial retrofit procedures and skills. Includes electrical safety, policies, and practices as relate to retrofit work. Students required to secure personal protective equipment as of first class session. (pass/no pass grading) (noncredit)

**BI 0804. Rapid Prototyping for Product Design***Units: 0*

Formerly known as CET 804

Hours: 18 (9 lecture, 9 laboratory)

Hands-on exposure to processes used to fabricate prototypes. An introduction to tools and technologies for prototyping, including design for manufacture. Example products show the process from idea to market including the series of prototypes that helped get the product to successful sales. Course materials cover safe hand tool use, power woodworking hand tools, wood shop tools, laser cutting, and CNC routers. (pass/no pass grading) (noncredit)

**BI 0805. Introduction to Industry and Occupational Safety for the Building Trade**

*Units: 0*

Formerly known as CET 805

Hours: 28 (24 lecture, 4 laboratory)

Provides an introduction to the building trades as an occupation. Covers a variety of construction safety and health hazards workers may encounter. Provides safety information to construction workers about employee and employer rights and responsibilities. Emphasizes identification, avoidance, abatement, control, and prevention of job-related hazards on construction sites. Upon successful completion, 10 hour OSHA card issued by instructor. (pass/no pass grading) (noncredit)

**BI 0806. Introduction to Building Trades and Tools**

*Units: 0*

Formerly known as CET 806

Prerequisite: Completion of BI 805 with grade of "Pass"

Hours: 48 (27 lecture, 21 laboratory)

Provides an overview of the local/regional building trade industry. Introduces students to the proper and safe operation of hand and power tools used in construction. Covers the fundamentals of construction math, measurements and blueprints. Emphasizes the employability skills such as time management, communication and proper attire for success in the construction industry. (pass/no pass grading) (noncredit)

**BI 0807. Basic Material Handling and Building**

*Units: 0*

Formerly known as CET 807

Prerequisite: Completion of BI 806 with grade of "Pass"

Hours: 53 (36 lecture, 17 laboratory)

Provides an overview of building materials and techniques for construction. Introduces students to basic trades including plumbing, electrical, and HVAC. Covers the fundamentals of framing, flooring, and tiling. Explains relevant building codes. (pass/no pass grading) (noncredit)

## **Program Student Learning Outcomes (PSLOs)**

- Demonstrate a fundamental understanding of the construction and energy industries and identify career pathways and opportunities.
- Identify code compliant construction.
- Demonstrate safety compliance in the construction and energy industries.
- Utilize fundamental building principles to lay out and construct structures and systems.
- Explain the principles of Green Building and prescribe building solutions utilizing emerging technology.