

Course Outline of Record

1. Course Code: BIT-024
2.
 - a. Long Course Title: California Energy Codes
 - b. Short Course Title: CA Energy Codes
3.
 - a. Catalog Course Description:
 This course covers California's Building Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24, Part 6), which establishes a minimum level of building energy efficiency to ensure that building construction, system design, and installation achieves energy efficiency and preserves the quality of both indoor and outdoor environments. It emphasizes the understanding and application of the Building Energy Efficiency Standards and supporting documents, the Reference Appendices, Residential Compliance Manual, and the Nonresidential Compliance Manual.
 - b. Class Schedule Course Description:
 This course covers California's Building Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24, Part 6).
 - c. Semester Cycle (*if applicable*): Every semester
 - d. Name of Approved Program(s):
 - BUILDING INSPECTION TECHNOLOGY Certificate of Achievement
4. Total Units: 3.00 Total Semester Hrs: 54.00
 Lecture Units: 3 Semester Lecture Hrs: 54.00
 Lab Units: 0 Semester Lab Hrs: 0
 Class Size Maximum: 28 Allow Audit: Yes
 Repeatability No Repeats Allowed
 Justification 0
5. Prerequisite or Corequisite Courses or Advisories:
Course with requisite(s) and/or advisory is required to complete Content Review Matrix (CCForm1-A)
 Advisory: MATH 060 and
 Advisory: ENG 070
6. Textbooks, Required Reading or Software: (*List in APA or MLA format.*)
 - a. California Building Standards Commission (2016). [California] Building Energy Efficiency Standards for Residential and Nonresidential Buildings (latest version) (Latest Edition/e). International Code Council.
 College Level: Yes
 Flesch-Kincaid reading level: N/A
 - b. California Building Standards Commission (2016). [California] Reference Appendices: Joint Appendices, Residential Appendices, Nonresidential Appendices (latest version) (Latest Edition/e). International Code Council.
 College Level: Yes
 Flesch-Kincaid reading level: N/A
 - c. California Building Standards Commission. [California] Residential Compliance Manual (latest version). International Code Council , 01-01-2016.
 - d. California Building Standards Commission. [California] Nonresidential Compliance Manual (latest version). International Code Council , 01-01-2016.
 - e. Various online related documents
7. Entrance Skills: *Before entering the course students must be able:*
 - a.
 - a. Develop, organize and express ideas in paragraph and essay form

- ENG 070 - Develop and expand vocabulary.
 - ENG 070 - Identify and employ prewriting activities.
 - ENG 070 - Demonstrate the ability to generate, develop and organize ideas into a cohesive essay using multiple paragraphs.
 - ENG 070 - Demonstrate through the writing process the ability to apply standard rules of grammar, punctuation and spelling in academic writing.
- b. Read texts and respond in writing at the literate level.
- ENG 070 - Comprehend and summarize readings.
 - ENG 070 - Read and identify main ideas and supporting details.
 - ENG 070 - Recognize and explain patterns of idea development in readings.
- c. Demonstrate the ability to participate in class discussions and assigned projects
- ENG 070 - Improve editing and revision strategies both individually and in peer review.
- d. Apply the basic operations appropriately to solve application problems that involve their use.
- MATH 060 - Compute using the four basic operations of addition, subtraction, multiplication, and division on the rational numbers in both fraction and decimal form.
 - MATH 060 - Apply methods of conversion between percents, decimals, and fractions.
 - MATH 060 - Recognize and convert between units of measurements in the American and metric systems.
 - MATH 060 - Use unit measure appropriately in applications.

8. Course Content and Scope:

Lecture:

1. Introduction to the Building Energy Efficiency Standards
 1. General history of the California Energy Efficiency Standards
 2. Why California Needs Building Energy Efficiency Standards
 3. Global Warming and Environmental Impacts - AB32, AB758, AB1103
 4. Peak Demands and Electricity Reliability
 5. California's Long Term Energy Efficiency Strategic Plan
 6. All California New Residential Construction Zero Net Energy (ZNE) by 2020
 7. All California New Nonresidential Construction ZNE by 2030
 8. Energy Efficiency for Existing Buildings
 9. Energy Economics
 10. Navigational Skills for Study and Research
 11. Impacts Of California Energy Code On Construction Projects
 12. Career Paths for Energy Administration
2. The Role Of Energy Codes
 1. Description of Codes In General
 2. Code Application to the Trades: Architect, Designer, Contractor, Building Dept. , Plan Check, Energy Consultant, Engineer, HERS Rater, Support Staff, Attorney, Property Mgmt, Building Owner
 3. Identifying Compliance Needs for Various Scenarios
 4. Meeting Compliance
 5. Document Preparation
 6. Methods of Compliance - Mandatory, Performance vs. Prescriptive
 7. Forms Management
 8. Project Submittal
 9. Project Management to Meet T24 Compliance
 10. Closing out a T24 Project
 11. Basics of Energy Auditing and the Standards
 12. Intro to Renewables and the Standards
3. Identifying Energy Code Requirements
 1. Residential vs. Non-Residential
 2. Building Types - Low-Rise Res, High-Rise Res, Non-Res, Hotels/Motels, Live-Work Spaces, Unconditioned & Newly Conditioned Spaces, Refrigerated Warehouses, Process, Historic
 3. Types of construction
 4. New Construction / Additions, Alterations and Repairs / Existing

5. Time Dependent Valuation (TDV)
6. Building Orientation
7. CA Climate Zones / Reference Weather- Reference Appendices JA-2
8. Mandatory Requirements
9. Prescriptive Compliance
10. Performance Compliance
11. Historical Buildings
12. Exempt Buildings
4. Compliance and Enforcement
 1. Phases - Design, Permit Application, Plan Check, Bldg Permit, Construction, Enforcement Agency Field Inspection, Field Verification and/or Diagnostic Testing, Approval for Occupancy, Occupancy
 2. Compliance Documentation
 3. Roles and Responsibilities - Designer, Documentation Author, Builder or General Contractor, Specialty Subcontractors, Enforcement Agency, HERS Provider, HERS Rater, Third Party Quality Control, Owner
 4. HERS Field Verification and Diagnostic Testing Measures - HERS Measures Identified
 5. HERS Group Sampling - Closed and Open Groups
 6. HERS Resampling
 7. HERS - Installer Requirements
 8. Data Registry Requirements - Reference Joint Appendices JA-7
 9. Building Commissioning - OPR, BOD, Design Review, Cx
5. Building Envelope Requirements - Fenestration (Windows, Skylights, Doors)
 1. Compliance Options - Mandatory/Prescriptive/Performance
 2. Definitions and Terminology
 3. Fenestration - Windows, Skylights and Doors
 4. Orientation
 5. NFRC Labeling - U-factor / SHGC / VT
 6. Window Coatings
 7. Dynamic Glazing
 8. Daylighting / Sidelit Requirements and Controls
 9. Shading Devices - Interior/Exterior
 10. Sidesfins
6. Building Envelope Requirements- Opaque Surfaces (Walls, Roofs, Floors)
 1. Compliance Options - Mandatory/Prescriptive/Performance
 2. R-Values and U- Factors
 3. Wall Assemblies - Wood Framing, Metal Framing, SIPS, ICF, AWS, Double and Staggered Wall Assemblies
 4. Field Applied Liquid Coatings
 5. Insulation Types and Characteristics
 6. Quality Insulation Installation (QII)
 7. Attic Ventilation and Radiant Barriers
 8. Cool Roof Ratings- CRRC
 9. High Performance Attics (HPA)
 10. High Performance Walls (AWS)
 11. Reduced Building Air Leakage
 12. Floor Assemblies - Slab on Grade, Raised Floor, Crawlspace, Thermal Mass
7. Building Mechanical HVAC Residential Requirements
 1. Common System Types
 2. Title 20 - California Appliance Regulations
 3. Mandatory Measures
 4. Design Conditions
 5. Equipment Sizing
 6. Heating Equipment
 7. Cooling Equipment
 8. Installation Requirements - Insulation, Clearances
 9. System Performance
 10. Air Distribution System - Ducts, Plenums, and Fans
 11. Air Filtration - Filter Media
 12. Zonally Controlled Systems

- 13. Thermostats/Controls
- 14. HERS Field Verification and Diagnostic Testing
- 15. Alternative Systems - Hydronic, Radiant Floor, Ground Source Heat Pump, Ice Storage, Non-Ducted
- 8. Building Mechanical HVAC Non-Residential Requirements
 - 1. Common System Types
 - 2. Title 20 - California Appliance Regulations
 - 3. Mandatory Measures
 - 4. Design Conditions
 - 5. Equipment Sizing
 - 6. Heating Equipment
 - 7. Cooling Equipment
 - 8. Pipe and Duct Distribution Systems
 - 9. Ventilation Requirements
 - 10. Economizers, FDD, DCV, VFD
 - 11. HVAC System Control Requirements
 - 12. Thermostats
 - 13. HERS Field Verification and Diagnostic Testing - Non-Res
 - 14. Mechanical Plan Check Documents
 - 15. Mechanical Acceptance Testing and Compliance Documentation
- 9. Residential Indoor Air Quality (IAQ)
 - 1. ASHRAE 62.2
 - 2. Residential IAQ Methods of Compliance
 - 3. Calculating IAQ Requirements
 - 4. ERV and HRV Systems
 - 5. Mechanical Exhaust Ventilation (IAQ) - Local/ Intermittent / Continuous / Controls
 - 6. Whole House Ventilation - Climate Zones, Calculations, Methods
- 10. Water Heating Requirements
 - 1. Overview
 - 2. Mandatory Requirements for Water Heaters
 - 3. Water Heating Equipment
 - 4. Instantaneous Gas Water Heaters
 - 5. Combined Hydronic System
 - 6. Distribution Systems - Parallel Piping, Demand Recirculation/ Auto and Manual On, Compact Design, Point of Use, Pipe Insulation
 - 7. Multi-family, Motel/Hotels and High-Rise Residential
 - 8. Field Verification of Water Heating Systems
 - 9. Solar Water Heating
 - 10. Swimming Pool and Spa Heating
 - 11. Shower Heads and Faucets - CALGreen Code
- 11. Residential HERS Verification, Testing, and Documentation Procedures-Residential Appendices RA1 - RA2 - RA3 - RA4
 - 1. CA Home Energy Rating Systems
 - 2. Summary of Measures
 - 3. Field Verification, Diagnostic Testing, and Certificate of Installation
 - 4. HERS Procedures - Duct Measures
 - 5. HERS Procedures - Air Conditioning Measures
 - 6. HERS Procedures - Mechanical Ventilation Measures: IAQ
 - 7. HERS Procedures - Building Envelope Measures: QII, Building Air Leakage, Blower Door
 - 8. HERS Procedures - Single Family Domestic Hot Water Measures
 - 9. HERS Procedures - Multi-Family Domestic Hot Water Measures
 - 10. HERS Documentation Registration
- 12. Lighting and Controls
 - 1. Mandatory Requirements for Lighting Control Devices and Systems, Ballasts, and Luminaires
 - 2. Lighting Controls
 - 3. Nonresidential Lighting and Controls
 - 4. Nonresidential Outdoor Lighting Controls and Equipment
 - 5. Sign Lighting Controls and Internally/Externally Illuminated Signs

6. Lighting Control Acceptance and Installation Requirements
7. Electrical Power Distribution Systems
8. Energy Management Control Systems (EMCS)
9. Lighting Power Density (LPD)- Complete Bldg, Area, and Tailored methods
10. Power Adjustment Factor
11. Automatic Daylighting
12. Sidelighting - Primary and Secondary
13. Lighting Acceptance Testing and Compliance Documentation
13. Solar Ready
 1. Overview
 2. Covered Occupancies
 3. Solar Zone - Min. Area, Orientation, Shading
 4. Construction Documents
 5. NSHP
14. Additions and Alterations in Existing Low-rise Residential Buildings
 1. Prescriptive Approach
 2. Water Heating
 3. Fenestration
 4. Space Conditioning Systems
 5. Duct Systems - Duct Sealing
 6. Roofs
 7. Lighting
 8. Performance Approach
15. Compliance Documents
 1. Residential Forms (Over 100 forms)
 2. Non-Residential Forms (Approx. 100 forms)
 3. Navigating Compliance Forms
 4. Understanding Compliance Forms
 5. Acceptance Requirements

Lab: *(if the "Lab Hours" is greater than zero this is required)*

9. Course Student Learning Outcomes:

1.

1. Explain the history of the Building Energy Efficiency regulation in California and related codes.
2. Identify the components of the Building Energy Efficiency Standards (Title 24, Section 6) and supporting documents.
3. Identify the requirements and methods of meeting energy code compliance, and building simulation requirements.
4. Examine the energy efficiency of a proposed design and construction of a building

10. Course Objectives: *Upon completion of this course, students will be able to:*

- a. Apply the codes in construction, regulation, and design
- b. Determine needed compliance documents for various project scenarios.
- c. Demonstrate skills for employment in private or public construction fields, or become inspector or plans examiners
- d. Collect pertinent data for compliance needs.
- e. Provide pertinent information for completion, submission, and registration of compliance documents.

11. Methods of Instruction: *(Integration: Elements should validate parallel course outline elements)*

- a. Discussion
- b. Individualized Study
- c. Lecture
- d. Participation
- e. Technology-based instruction

12. Assignments: *(List samples of specific activities/assignments students are expected to complete both in and outside of class.)*

In Class Hours: 54.00

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Outside Class Hours: 108.00

a. In-class Assignments

1. Presentation of course subjects and materials.
2. Review code sections.

b. Out-of-class Assignments

1. Reading assignments of codes and handouts
2. Visit construction sites
3. Review code sections presented in class

13. Methods of Evaluating Student Progress: *The student will demonstrate proficiency by:*

- Reading reports
- Computational/problem solving evaluations
- True/false/multiple choice examinations
- Mid-term and final evaluations
- Student participation/contribution

14. Methods of Evaluating: Additional Assessment Information:

15. Need/Purpose/Rationale -- *All courses must meet one or more CCC missions.*

CSU GE Area A: Communication in the English Language and Critical Thinking

Demonstrate an understanding of ethical issues to make sound judgments and decisions.

PO - Career and Technical Education

Fulfill the requirements for an entry- level position in their field.

Apply critical thinking skills to execute daily duties in their area of employment.

Apply critical thinking skills to research, evaluate, analyze, and synthesize information.

Display the skills and aptitude necessary to pass certification exams in their field.

Exhibit effective written, oral communication and interpersonal skills.

IO - Scientific Inquiry

Collect and analyze data. Skills of data collection include an understanding of the notion of hypothesis testing and specific methods of inquiry such as experimentation and systematic observation.

Analyze quantitative and qualitative information to make decisions, judgments, and pose questions.

IO - Critical Thinking and Communication

Apply principles of logic to problem solve and reason with a fair and open mind.

Summarize, analyze, and interpret oral and written texts, with the ability to identify assumptions and differentiate fact from opinion.

16. Comparable Transfer Course

University System	Campus	Course Number	Course Title	Catalog Year
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17. Special Materials and/or Equipment Required of Students:

18. Materials Fees: Required Material?

Material or Item

Cost Per Unit

Total Cost

19. Provide Reasons for the Substantial Modifications or New Course:

Remain current with California Building Code Mandates

20. a. Cross-Listed Course (*Enter Course Code*): *N/A*

b. Replacement Course (*Enter original Course Code*): *N/A*

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21. Grading Method (*choose one*): Letter Grade Only

22. MIS Course Data Elements

- a. Course Control Number [CB00]: CCC000573819
- b. T.O.P. Code [CB03]: 95720.00 - Construction Inspection
- c. Credit Status [CB04]: D - Credit - Degree Applicable
- d. Course Transfer Status [CB05]: B = Transfer CSU
- e. Basic Skills Status [CB08]: 2N = Not basic skills course
- f. Vocational Status [CB09]: Clearly Occupational
- g. Course Classification [CB11]: Y - Credit Course
- h. Special Class Status [CB13]: N - Not Special
- i. Course CAN Code [CB14]: N/A
- j. Course Prior to College Level [CB21]: Y = Not Applicable
- k. Course Noncredit Category [CB22]: Y - Not Applicable
- l. Funding Agency Category [CB23]: Y = Not Applicable
- m. Program Status [CB24]: 1 = Program Applicable

Name of Approved Program (*if program-applicable*): BUILDING INSPECTION TECHNOLOGY

Attach listings of Degree and/or Certificate Programs showing this course as a required or a restricted elective.)

23. Enrollment - Estimate Enrollment

First Year: 28

Third Year: 50

24. Resources - Faculty - Discipline and Other Qualifications:

a. Sufficient Faculty Resources: Yes

b. If No, list number of FTE needed to offer this course: N/A

25. Additional Equipment and/or Supplies Needed and Source of Funding.

N/A

26. Additional Construction or Modification of Existing Classroom Space Needed. (*Explain:*)

N/A

27. FOR NEW OR SUBSTANTIALLY MODIFIED COURSES

Library and/or Learning Resources Present in the Collection are Sufficient to Meet the Need of the Students Enrolled in the Course: Yes

28. Originator Donbert M. Bitanga Origination Date 02/07/16