

**Course Outline**

**COURSE:** CARP 213                    **DIVISION:** 50                    **ALSO LISTED AS:**

**TERM EFFECTIVE:** Fall 2016                    **Inactive Course**

**SHORT TITLE:** ENGINEERED STRUCTURAL SYSTEMS

**LONG TITLE:** Engineered Structural Systems

<u>Units</u>	<u>Number of Weeks</u>	<u>Type</u>	<u>Contact Hours/Week</u>	<u>Total Contact Hours</u>
1	1	Lecture:	6	6
		Lab:	30	30
		Other:	0	0
		Total:	36	36

**COURSE DESCRIPTION:**

This course covers the design of heavy timber construction, lamination, dams, bridges and trusses. Construct, in proper sequence, a panel roof system having hinge connectors, steel caps, beam seats, and sawn lumber roof members. Construct a truss roof system. Tie the basic knots used in rigging. Direct a crane using university recognized hand signals.

**PREREQUISITES:**

**COREQUISITES:**

**CREDIT STATUS:** C - Credit - Degree Non Applicable

**GRADING MODES**

L - Standard Letter Grade

**REPEATABILITY:** N - Course may not be repeated

**SCHEDULE TYPES:**

02 - Lecture and/or discussion

03 - Lecture/Laboratory

04 - Laboratory/Studio/Activity

**STUDENT LEARNING OUTCOMES:**

1. The student will demonstrate the ability to locate and install bearing hangers, bridging, blocking, and bracing.

Measure: Class Performance, Quizzes

PLO: 2

ILO: 1, 2, 3, 7

GE-LO:

Year assessed or anticipated year of assessment: 2012-13

2. The student will layout and install wood columns and beams with proper post bases, post caps, and hangers.

Measure: Class Performance, Written Exams

PLO: 2

ILO: 1, 2, 3, 7

GE-LO:

Year assessed or anticipated year of assessment: 2012-13

#### PROGRAM LEARNING OUTCOMES:

1. Demonstrate journey level skills, including those skills necessary to build all concrete infrastructures that comprise the California transportation system.
2. Locate on the blueprints and in the specifications, the information needed to construct various types of structures and assemble its various components.
3. Perform horizontal layout and vertical layout of wood framed wall components. Install interior and exterior trims and moldings. Construct various types of roofs and stairs.

#### CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS

Inactive Course: 11/28/2016

Out-of class assignments: For each topic, the student will read chapters and do homework assignments at the end of those chapters.

2 lec, 10 lab

- A. Framing systems
  - a. Type of construction
  - b. Uniform Building Code
  - c. Framing systems
    - a. Conventional framing
    - b. Heavy timber
    - c. Ordinary construction
    - d. Plywood box
  - d. Plan conventions
- A. Framing materials
  - 1. Properties of wood
    - A. Grading of wood products
    - B. Soft wood lumber
    - C. Structural glue-laminated timbers
    - D. Wood-plywood glued structural members
    - E. Plywood
    - F. Material quantities
  - G. Poles
- B. Framing layout, structural principles and design
  - 1. Structural plans and framing layout

12/5/2016

1. Grids
2. Tiedown symbols
3. Shear wall layout
4. Diaphragm construction and nailing schedule
5. Using the right triangle for layout
6. Laying out a brace
2. Structural principles and design
  1. Load
  2. Types of loads
  3. Strength
  4. Stiffness
  5. Horizontal members
  6. Camber
  7. Columns
  8. Diaphragm construction
- C. Tools and equipment
  1. Hand tools
  2. Power tools
    1. Safety rules for power tools
    2. Extension cords
  3. Procedures

SLO: The student will demonstrate the ability to safely use a portable electric circular saw, gasoline powered chain saw, electric drill motor, heavy duty reciprocating saw, electric rotary hammer, and electric impact wrench. The student will demonstrate the ability to follow engineered nailing and fastening schedules.

Assignments: Read the chapters covered in the lecture and do the homework exercises at the end of the chapters. Answer the study guide questions on the assigned subject.

Demonstrate the ability to safely use a portable electric circular saw, gasoline powered chain saw, electric drill motor, heavy duty reciprocating saw, electric rotary hammer, and electric impact wrench. Demonstrate the ability to follow engineered nailing and fastening schedules.

2 lec/10 lab

- D. Connectors and structural hardware
  1. Common fasteners
  2. Timber fasteners
  3. ICBO listed fasteners
- E. Rigging
  - a. Weight and shape
  - b. Wire rope
    1. Wire rope lay
    2. Safety factors
    3. Wire rope end fittings
  - c. Fiber rope
    - a. Elements
    - b. Strength
    - c. Whipping ends
  - d. Knots
  - d. Chains
  - e. Slings
  - f. Hooks
  - g. Hoisting materials

- F. Erecting procedures
  - 1. Lifting glulam beams
  - 2. Erecting trusses
  - 3. Temporary bracing
  - 4. Ladders, stairs, and ramps

SLO: The student will identify the proper way to uncoil a spool of rope. The student will tie eight basic knots and select the proper knot for a specific rigging operation. The student will demonstrate the ability to locate and install bearing hangers, bridging, blocking, and bracing.

Assignments: Read the chapters covered in the lecture and do the homework exercises at the end of the chapters. Answer the study guide questions on the assigned subject.

Identify the proper way to uncoil a spool of rope. Tie eight basic knots and select the proper knot for a specific rigging operation. Demonstrate the ability to locate and install bearing hangers, bridging, blocking, and bracing.

2 lec/10 lab

- G. Plank and beam construction
  - a. Plank and beam framing
  - b. Columns
  - c. Girders, beams, and joist
  - d. Compound beams
  - e. Decking material
    - a. Length and lay-up arrangements
    - b. Application and nailing schedules
    - f. Safety in plank and beam construction
- H. Glulam construction and panel roof systems
  - a. Glulam structural materials
    - a. Fabrication
    - b. Glulam timber specifications
    - c. Advantages and limitations of glulams
    - d. Typical beam shapes
    - e. Cantilever and continuous span systems
  - b. The panel roof system
- I. Trusses
  - A. Construction of trusses
    - a. Height-to-span ratio
    - b. Camber
    - c. Timber connectors
  - B. Light weight high strength trusses
  - C. Bracing trusses and beams during construction
  - D. Safety in erecting trusses, beams, and arches
    - a. Working at heights
    - b. Advanced planning for safety
    - c. Safeguarding against overloading

SLO: The student will demonstrate the proper use of hand signals to direct crane operations. The student will layout and install wood columns and beams with proper post bases, post caps, and hangers. The student will demonstrate the ability to install wood and wood-metal trusses and engineered manufactured structural components. The student will demonstrate the ability to locate and install lateral seismic ties in a roof structure.

Assignments: Read the chapters covered in the lecture and do the homework exercises at the end of the chapters. Answer the study guide questions on the assigned subject.

Demonstrate the proper use of hand signals to direct crane operations. Layout and install wood columns and beams with proper post bases, post caps, and hangers.

Demonstrate the ability to install wood and wood-metal trusses and engineered manufactured structural components. Demonstrate the ability to locate and install lateral seismic ties in a roof structure.

2 hours

Final exam

**METHODS OF INSTRUCTION:**

- A. Lecture and discussion
- B. Visual aids
- C. Demonstrations
- D. Group hands-on exercise
- E. Individual hands-on exercise
- F. One-on-one hands-on instruction

**METHODS OF EVALUATION:**

The types of writing assignments required:

Written homework

Reading reports

Lab reports

Essay exams

The problem-solving assignments required:

Homework problems

Field work

Lab reports

Quizzes

Exams

The types of skill demonstrations required:

Class performance

Field work

Performance exams

The types of objective examinations used in the course:

Multiple choice

True/false

Matching items

Completion

Other category:

None

The basis for assigning students grades in the course:

Writing assignments: 10% - 30%

Problem-solving demonstrations: 10% - 40%

Skill demonstrations: 30% - 80%

Objective examinations: 10% - 30%

Other methods of evaluation: 0% - 0%

**REPRESENTATIVE TEXTBOOKS:**

Required:

Barclay, CTCNC. Construction Safety Orders 1 & 2, Engineered Structural Systems, Engineered Structural Systems Lesson Book. Thomas West, CTCNC, 2013. Or other appropriate college level text.

Reading level of text, Grade: 10 Verified by: publisher/dvt

#### **ARTICULATION and CERTIFICATE INFORMATION**

Associate Degree:

CSU GE:

IGETC:

CSU TRANSFER:

Not Transferable

UC TRANSFER:

Not Transferable

#### **SUPPLEMENTAL DATA:**

Basic Skills: N

Classification: Y

Noncredit Category: Y

Cooperative Education:

Program Status: 1 Program Applicable

Special Class Status: N

CAN:

CAN Sequence:

CSU Crosswalk Course Department:

CSU Crosswalk Course Number:

Prior to College Level: Y

Non Credit Enhanced Funding: N

Funding Agency Code: Y

In-Service: N

Occupational Course: A

Maximum Hours:

Minimum Hours:

Course Control Number: CCC000500346

Sports/Physical Education Course: N

Taxonomy of Program: 095210