CNST A285: LIGHT STEEL FRAME CONSTRUCTION

Item	Value
Curriculum Committee Approval Date	12/02/2020
Top Code	095200 - Construction Crafts Technology
Units	2.5 Total Units
Hours	81 Total Hours (Lecture Hours 27; Lab Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	Yes
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S)

Course Description

An introductory hands-on course that covers the fundamentals of utilizing light frame steel for residential framing in place of wood. Raised floor construction, wall framing and trussed roof fabrication and installation including applicable building codes, blueprint reading, estimating, and inspections are covered. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Demonstrate knowledge of blueprint reading, building codes, and the methods and procedures used in the construction of a steel frame home.
2. Physically construct a steel frame residential structure including underpinning, wall framing, conventional roof system and a roof truss systems using the appropriate power tools and fasteners.
3. Demonstrate awareness of job safety and the ability to work as a team.

Course Objectives

- 1. Discuss the types and methodologies used in residential steel frame construction as practiced in various regions of the country
- 2. Discuss the notable differences of wood framing techniques versus light gauge steel framing.
- 3. Determine the sizing of light gauge cold formed steel raised floor underpinning from building plans and prescriptive code tables.
- 4. Construct/assemble light gauge cold formed steel raised floor underpinning, floor joists and sub-flooring materials.
- 5. Formulate and determine the sizing of window and door headers, sills, cripples, stress blocking and bracing from building plans and prescriptive code tables.
- 6. Construct/assemble code compliant residential steel framed walls that are vertical and straight for the next level of framing and other building trades.
- 7. Formulate and determine the sizing of the structural members in a conventional roof system from building plans and prescriptive code tables.
- 8. Construct/assemble a code compliant conventional steel rafter system including eaves, frieze and verges.
- 9. Compute and make necessary shortening adjustments for ? California? framed rafters.
- 10. Assemble a ?California? roof with light gauge steel rafters.
- 11. Assemble from construction drawing a simple engineered roof truss system.
- 12. Install/assemble a simple engineered roof truss system.
- 13. Perform/construct additional details of steel framing construction including pick-up items, arched openings and the interface for electrical, plumbing and HVAC systems.
- 14. Calculate, layout and assemble the stair carriages for a steel framed house.

Lecture Content

Introduction An introduction to the course which includes, policies and procedures, lab procedures, text and blueprints required, attendance and grading procedures. Students will take a pre-course test to determine general knowledge of building terminology, procedures, and math ability. (Not to be used to determine entrance to the class.) After a presentation is given on safety policies, general and specific and with demonstrations on power tool use and safety, students will pass a written safety exam. Students will participate in the formation of working lab crews and the selection of crew leaders. Students will use blueprint set foundation plan to relate drawing to physical layout of house. Pre-planning and individual responsibilities determined by crew leader. Students will be instructed in the types and methodologies used in residential steel frame construction as practiced in various regions of the country. Students will be instructed in the planning, layout and installation of girders, posts and mudsills including applicable building codes, methods of attachment and estimating techniques. Students will select, assemble and prepare steel units for fabrication of girders, posts and mudsills. To be inspected by instructor prior to cutting or attaching. Students will attach and install members to foundation checking for true alignment and level. Students will be instructed in the fabrication and placement of floor joists, blocking and floor decking including applicable building codes, methods of attachment and estimating techniques. Given a different foundation plan, students will determine joist and blocking layout and estimate lumbe r and lengths of floor joists, blocking, attachments and sub-floor materials. Students will select and prepare steel units for installation of floor joists and plywood sheets for installation of floor decking. Students will lay-out and attach floor joists, and edge blocking (rim joists) and stress blocking over girders. Students will lay-out and attach plywood decking to floor joists. Students will be instructed in the various components of a wall frame and differences in attachments to concrete and wood sub-floors. Wall layout. Notable differences to wood framing techniques will also be discussed. Students will be given an elevation of a wall frame constructed with wood members. Students will be required to replace all of the wood members with the corresponding steel member and note types and sizes of attachments. Students will layout and snap in (chalk line) all interior and exterior walls. Students will select and prepare steel studs and plates for installation. Students will attach base plate stock in preparation for attachment of studs. Students will be instructed in the procedures for wall layout and snapping lines, locating all doors and windows, wall intersections and drawing techniques including face of stud and centerline dimensioning. Students will use an alternate floor plan to determine exact dimensions for all wall layouts and the locations of all doors and windows as if they were going to lay out and snap in the lines. Students will continue

to layout the wall frame on the subfloor, including rake wall layout on the concrete slab. St udents will be instructed in the sizing of window and door headers, sills, cripples, stress blocking and bracing. Students will be instructed in the building and use of a story-pole. Students will draw a full wall, including all wall components, openings, headers, sills, blocking and bracing and specifying all attachment types and sizes. Students will layout and build a story-pole for use in the determination of header, sill and cripple fabrication. Students will begin the actual construction of the wall frame attaching units in balloon frame fashion. Students will be instructed in the building of balloon wall frames and the use of scaffolding. Some scaffolding construction techniques will be discussed. Students will be given a take-home test on all construction techniques discussed to date. Test will be objective and cover true-false, multiple-choice and fill-in-the-blank type questions. Students will continue erecting the wall frame of the structure. Students will be instructed in additional details of construction that includes setting beams, drop ceilings, cat-walks, scuttle, drywall backing and soffits. Students will be instructed in additional details of construction including soffits, pick-up, arched openings and the interface for electrical, plumbing and HVAC. Students will continue erecting the wall frame of the structure. Students will be instructed in the various types of roofs, roof frames. Students will be instructed in the terminology of roof framing. Students will be instructed in the various types of roof trusses and truss construction. n bsp; Students will be given a basic house plan and required to lay-out and design at least two different roof styles on the plan. Students will be instructed in the construction of jigs for the fabricating of roof trusses. Students will be given a list of roof truss terms and asked to draw a truss using each of the items in the list in correct construction detail. Students will lay out and fabricate a truss jig on site for the fabrication of roof trusses. Students will be instructed in the fabrication of roof trusses using fabricated jigs. Students will be given a specific truss design and building span to work with and be required to draw, and identify all members, including all fasteners. Students will fabricate additional roof truss jigs according to the requirements of the building plan. Students will be instructed in roof math calculations for pitch, rise, run, and span. Given the pitch and span for a roof, students will draw the roof truss, identify total rise, and location of tension and compression webs. Students will be instructed in the step method of rafter layout using a framing square and the use of Reicher s Full Length Roof Framer for the layout of rafter lengths by the line-length method. Students will be given a series of problems to solve out-of-class with regard to roof design and rafter layout using step method calculations and Reicher s Full Length Roof Framer. Students will be instructed in the manner of erecting roof trusses on the wall frame including attachments, tie-ins and truss bracing. Students will erect the roof truss system on the building. Students will be instructed i n the design and fabrication of Dutch-Hips, Dormers, Mansards and A-Frames. Students will be instructed in the attachment of soffit, fascia and frieze blocking and will finish the erection of the roof truss system and install soffit, fascia and frieze. Students will be required to design (drawing) a Mansard roof truss identifying all members and attachments. Students will begin tear-down procedures, removing all members, disassembling and storing all steel units.

Lab Content

Introduction An introduction to the course which includes, policies and procedures, lab procedures, text and blueprints required, attendance and grading procedures. Students will take a pre-course test to determine general knowledge of building terminology, procedures, and math ability. (Not to be used to determine entrance to the class.) After a presentation is given on safety policies, general and specific and with demonstrations on power tool use and safety, students will pass a written safety exam. Students will participate in the formation of working lab crews and the selection of crew leaders. Students will use blueprint set foundation plan to relate drawing to physical layout of house. Pre-planning and individual responsibilities determined by crew leader. Students will be instructed in the types and methodologies used in residential steel frame construction as practiced in various regions of the country. 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Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- Lab (04)
- DE Live Online Lab (04S)

Instructional Techniques

Classroom lecture utilizing chalkboard, overhead transparencies, video presentations, film and slide projections. Syllabus and handouts. Laboratory demonstrations by staff requiring student participation for skill level determination. Students, working cooperatively as a crew, to physically erect the structure with appropriate attachments.

Reading Assignments

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Writing Assignments

Writing assignments as defined in homework section of topic outline. Applied skills demonstrations in lab activities as defined in topic outline.

Out-of-class Assignments

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Demonstration of Critical Thinking

Objective quizzes and tests including True-False, Multiple Choice, Matching and Fill-In-The-Blank type questions. Some problem solving required. 90% minimum attendance record. Subjective analysis of ability, initiative, attitude, adherence to good safety and work practices in laboratory related activities. A comprehensive Mid-Term and Final Exam, primarily objective as in (1) above.

Required Writing, Problem Solving, Skills Demonstration

Writing assignments as defined in homework section of topic outline. Applied skills demonstrations in lab activities as defined in topic outline.

Eligible Disciplines

Construction technology: Any bachelor's degree and two years of professional experience, or any associate degree and six years of professional experience.

Textbooks Resources

1. Required National Association of Home Builders Research Center. Prescriptive Method for Residential Cold-Formed Steel Framing, ed. NAHB,, 1997 Rationale: latest

Other Resources

1. Syllabus, Blueprints, Students to supply some tools.