

Washtenaw Community College Comprehensive Report

WAF 119 Ironworker Pre-Apprenticeship Rigging and Cranes Effective Term: Fall 2020

Course Cover

Division: Advanced Technologies and Public Service Careers

Department: Welding and Fabrication

Discipline: Welding and Fabrication

Course Number: 119

Org Number: 14600

Full Course Title: Ironworker Pre-Apprenticeship Rigging and Cranes

Transcript Title: IW Pre-App. Rigging & Cranes

Is Consultation with other department(s) required: No

Publish in the Following: College Catalog , Web Page

Reason for Submission: New Course

Change Information:

Rationale: New course to align with the needs of the Ironworkers Pre-Apprenticeship Certificate.

Proposed Start Semester: Winter 2020

Course Description: In this course, students will be introduced to rigging safety, application of rigging equipment and rigging techniques. Topics covered include but are not limited to: rigging hazards, rigger safety, flagger procedures, appropriate rigging signals, material handling, rigging calculations, rigging hardware, crane equipment and operations. Preparation for the Crosby Level 1 Rigging Certification test is also covered. This course is required for the Ironworkers Pre-Apprenticeship Certificate.

Course Credit Hours

Variable hours: No

Credits: 2

Lecture Hours: Instructor: 15 **Student:** 15

Lab: Instructor: 45 **Student:** 45

Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 60 **Student:** 60

Repeatable for Credit: NO

Grading Methods: Letter Grades

Audit

Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing

Reduced Reading/Writing Scores

College-Level Math

No Level Required

Requisites

Prerequisite

Academic Reading Level 3, Academic Writing Level 2

General Education

Degree Attributes

Below College Level Pre-Reqs

Request Course Transfer

Proposed For:

Student Learning Outcomes

1. Inspect and utilize rigging equipment safely.

Assessment 1

Assessment Tool: Skills checklist

Assessment Date: Winter 2023

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Departmentally-developed rubric based on Ironworkers Union quality acceptance criteria.

Standard of success to be used for this assessment: 70% of the students will score 70% or higher

Who will score and analyze the data: Departmental faculty

2. Identify and apply rigging, hoist and sling equipment for various lifting situations.

Assessment 1

Assessment Tool: Skills checklist

Assessment Date: Winter 2023

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Departmentally-developed rubric

Standard of success to be used for this assessment: 70% of the students will score 70% or higher.

Who will score and analyze the data: Department faculty

3. Identify the various types of cranes and their applications in the Ironworker trade.

Assessment 1

Assessment Tool: Outcome-related exam questions

Assessment Date: Winter 2023

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Answer key

Standard of success to be used for this assessment: 70 of students will score 70% OR higher.

Who will score and analyze the data: Department faculty

4. Recognize and apply safe working procedures and practices while using cranes in the Ironworker trade.

Assessment 1

Assessment Tool: Skills checklist

Assessment Date: Winter 2023

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Departmentally-developed rubric

Standard of success to be used for this assessment: 70% of the students will score 70% or higher.

Who will score and analyze the data: Department faculty

Course Objectives

1. Unit 1: Discuss the evolution and history of rigging technology.
2. Unit 2: Identify the types and characteristics of fiber rope.
3. Unit 2: Identify safety factors, and calculate safe working loads using fiber rope.
4. Unit 2: Inspect, splice and use fiber rope knots, bends and hitches when rigging.
5. Unit 3: Identify components and parts of line in a reeved system.
6. Unit 3: Calculate line load, number of parts of a line maximum load and line pull.
7. Unit 3: Select blocks for reeving, and identify types of falls.
8. Unit 4: Apply the requirements for selecting wire rope, and describe the design and construction of wire rope.
9. Unit 4: Identify grades, strand classifications, construction and lay of wire rope.
10. Unit 4: Identify characteristics of a preformed wire rope and wire rope cores.
11. Unit 4: Determine the size, fatigue and abrasion resistance characteristics of wire rope.
12. Unit 4: Determine size, factor of safety and safe working load of wire rope.
13. Unit 4: Install, inspect, use, handle, maintain, lubricate, store, seize and cut, splice and attach end fittings and connections to wire ropes.
14. Unit 5: Use drums, sheaves, hooks, rings, links, swivels and shackles when rigging.
15. Unit 5: Use eye bolts, turnbuckles, spreaders, equalizer beams and blocks when rigging.
16. Unit 6: Describe characteristics of fiber rope slings, synthetic webbing, wire or chain mesh slings, chain slings and wire rope slings.
17. Unit 7: Describe the basics of using, inspecting, maintaining and safely utilizing chains.
18. Unit 8: Demonstrate ability to use jacks, rollers, come-alongs, various types of hoists, winches, anchorage points, beam clamps, slings, welded lugs and powered industrial trucks.
19. Unit 9: Demonstrate ability to follow rigging procedures and precautions.
20. Unit 10: Describe the components, general practices, hazards and hydraulics of gantry systems.
21. Review the Crosby Level 1 Certification.
22. Cranes Unit 1: Explain the purpose of OSHA subpart CC and the importance of local standards that apply to the use of cranes.
23. Unit 2: Discuss the characteristics of mobile cranes.
24. Unit 2: Identify the basic parts of a boom truck, industrial crane, carrier mounted lattice boom crane, crawler mounted lattice boom crane, carrier mounted telescopic boom crane, crawler mounted telescopic boom crane.
25. Unit 2: Identify the basic parts of a rough terrain crane, mobile tower crane, heavy lift mobile crane and an overhead crane.
26. Unit 3: Explain the concept of center of gravity, the crane's center of gravity and changes in location of center of gravity during rotation of the upper works.
27. Unit 3: Define backward stability, factors related to structural failure, wire rope safety and effects of overloading.
28. Unit 4: Define quadrants of operation and sweep areas for carriers mounted cranes, rough terrain cranes, crawler mounted cranes and boom trucks.
29. Unit 5: Describe the purpose of a load chart.
30. Unit 5: Consider the configuration of the crane base, boom and quadrants of operation.
31. Unit 5: Determine boom length, chart listings, boom angle, load radius and values of each.
32. Unit 5: Describe capacity limitations due to strength or stability, read main boom load charts, determine gross capacity and net capacity.
33. Unit 5: Determine parts of line, weight and size of the hook block, weight of rope and the range of diagrams.
34. Unit 6: Describe how poor machine condition and not being configured to specification impacts crane capacity.
35. Unit 6: Describe how eccentric reeving, improper use of outriggers, soft foot, crane not being level, side loading, an increase of load radius, rapid swing rate, impact loading, rapid acceleration or deceleration and high wind speeds impact crane capacity.

36. Unit 7: Understand and recognize roles and responsibilities, site preparation, ground condition requirements, proper use of outriggers, ground pressure characteristics, leveling the crane and inspecting the wire rope.
37. Unit 7: Identify hazards of boom assembly and disassembly, handling of boom sections, assembly and dismantling of short and long lattice booms.
38. Unit 8: Identify the hazards associated with test lifts, the rate of tipping, effects of hitting the boom and the cause of backwards collapse of booms.
39. Unit 8: Estimate load weights, precautions to take and interpretation of boom angle indicators during critical load lifts.
40. Unit 8: Proper use of crane signals, how to perform pick and carry operations, perform multiple crane lifts and tilt up operations and the proper use of equalizer beams on dual lifts.
41. Unit 9: Identify precautions when working near power lines and transmitters.
42. Unit 10: Identify common causes of failure with tower cranes, list the steps to assemble, erect and dismantling of the tower, turntable, mast, jib, counter jib, main jib and counterweight.
43. Unit 10: Describe electrical, wire rope and bolting installation procedures, use of the erection checklist and listing steps for climbing a crane.
44. Unit 11: Discuss the steps in order to handle the load with crane signaling procedures, identify precautions when more than one crane is operating in the same area and when traveling with a load on a rail mounted crane.
45. Unit 12: Identify personnel hoisting equipment and follow safe practices and guidelines when preparing for hoisting personnel.
46. Unit 13: Identify types of derricks and understand the regulations associated with derricks.
47. Unit 13: Identify and explain the differences between land based, floating, gantry and sideboom cranes and explain the regulations of piledrivers.

New Resources for Course

Course Textbooks/Resources

Textbooks

International Association of Bridge Structural, Ornamental, and Reinforcing Iron Workers, AFL-CIO. *Cranes-Student Workbook*, ed. International Association of Bridge Structural, Ornamental, and Reinforcing Iron Workers, AFL-CIO, 2017

International Association of Bridge Structural, Ornamental, and Reinforcing Iron Workers, AFL-CIO. *Rigging for Ironworkers-reference manual*, ed. International Association of Bridge Structural, Ornamental, and Reinforcing Iron Workers, AFL-CIO, 2017

International Association of Bridge Structural, Ornamental, and Reinforcing Iron Workers, AFL-CIO. *Rigging for Ironworkers-student workbook*, ed. International Association of Bridge Structural, Ornamental, and Reinforcing Iron Workers, AFL-CIO, 2017

International Association of Bridge Structural, Ornamental, and Reinforcing Iron Workers, AFL-CIO. *Cranes-Reference manual*, ed. International Association of Bridge Structural, Ornamental, and Reinforcing Iron Workers, AFL-CIO, 2017

Manuals

Periodicals

Software

Equipment/Facilities

Level III classroom

Reviewer

Faculty Preparer:

Amanda Scheffler

Department Chair/Area Director:

Glenn Kay II

Action

Faculty Preparer

Recommend Approval

Date

Nov 08, 2019

Nov 08, 2019

