Glendale Unified School District

High School

June 19, 2018

Department:	Career Technical Education
Course Title:	Technical Cabinet Making & Carpentry 7-8 (replace Tech Cab Crp 1-4; 5505/5506)
Course Code:	5505D/5506D
Grade Level(s):	11-12
School(s) Course Offered:	Glendale High School
UC/CSU Approved (Y/N, Subject):	Yes, College-Preparatory Elective ("g")/Interdisciplinary
Course Credits:	10
Recommended Prerequisite:	Completion of Construction 5-6 with a grade of C or better.
Recommended Textbook:	Modern Carpentry, Willis H. Wagner & Howard Bud Smith, Goodheart-Willox Company, 11th Ed., 2008
Course Overview:	Technical Cabinet Making and Carpentry 7-8 is the first capstone course under the Building and Construction Trade Industry Sector. Technical Cabinet Making and Carpentry 7-8 integrates skills and concepts from the Building and Construction Trades with applied mathematics and English. As a natural progression, students apply the craft skills required to design and build a variety of scaled structures that meet current code requirements. In addition, students make real-world connections between construction, math, and English using written projects, construction documents that include creating blueprints, project packets, and student-centered construction projects. This course provides students the opportunity to apply academic knowledge and technical skills through a

hands- on curriculum that meets pre-apprenticeship requirements for the National Building Trades Council.

First Semester-Course Content

Unit 1: **Orientation and Safety** *(4 weeks)*

STANDARDS
Building and Construction Anchor Standards: 1.0, 2.1, 2.6, 3.3, 4.1, 5.1, 6.1, 6.2, 6.3, 7.1, 7.1, 9.7
Cabinetry, Millwork and Woodworking Pathway Standards: A1.1, A1.2, A2.1, A2.3, A3.1, A.10.1, A11.1, A11.2
Common Core State Standards: RSIT 11-12.2, 11-12.7, 11-12.10, RHSS 11-12.7, RLST 11-12.2

A. Students receive instruction and extended practice in the orientation and industry awareness of the construction industry. Students understand and use the vocabulary of the construction trades, as well as the the vocabulary of various math concepts as they apply to the construction industry. They study math and building sequences related to measurements, geometry, and practical building applications that are related to the construction industry.

Learners receive instruction in measurement and marking/layout, the fundamental skills which will be needed to complete all of the applied mathematics, English, and Construction units and assignments that follow in this course. This will include -- review of fractions and decimals: converting fractions to higher or lower terms, improper fractions and mixed numbers, common denominators, and adding, subtracting, multiplying, and dividing with decimals and fractions; reading a ruler and a tape measure while incorporating fractional measurements to 1/16 of an inch in a building project; reading a fractional caliper to measure material to desired thicknesses.

Students practice the key concepts of general shop safety, learning the specific safety rules for the tooling that is applicable to the task at hand and acquiring the knowledge and skills required to work in a safe environment. Shop safety procedures will include; transporting sharp woodworking tools to prevent injury, shop etiquette as it applies to cleanliness and safety, safe and appropriate use of basic, non-powered hand tools including cross-cut saws, rip saws, pull-saws, coping saws, hammers and chisels, hand planes, sand paper of various grits, etc.

Students take written and practical safety tests that are applicable to each tool demonstrated as well as general shop safety procedures.

B. Sample Assignment: Create a Skill Block
After instruction on specific tool safety for each shop tool, demonstrate safe operation of shop tools by creating individual projects. To prepare them for this, they are given an orthographic drawing that they must interpret to create their individual project. Students are given different block of wood and, using the tools of instruction, they demonstrate proper tool safety to the teacher. In order to demonstrate understanding of

applied math concepts, students also use geometry tools (i.e., protractor, compass) in order to create shapes in the wood. Ultimately the shapes need to match the given orthographic drawing. While demonstrating, students should also communicate with their instructor, using the vocabulary of the instruction trades, their understanding of how the tools should be used.

Unit 2: **Intermediate/Advanced Construction Techniques** *(6 weeks)*

STANDARDS
Building and Construction Anchor Standards: 1.0, 2.5, 2.6, 3.7, 4.5, 5.1, 5.2, 6.3, 6.4, 6.6,
Cabinetry, Millwork and Woodworking Pathway Standards:A5.1, A5.2, A5.3, A5.6, A5.11, A5.12, A7.1, A7.2, A7.7, A9.1, 9.2, 9.3, A9.6, A10.1, A10.4, A10.5, A11.1
Common Core State Standards: RSIT 11-12.2, 11-12.10, RLST 11-12.10, F-TF 1.1, G-C 1, G-GMD 1, 4, 5, G-GPE 5, 7

A. In this unit students will explore numerous building and construction trades and discover their unique aptitudes and specific skill sets as they build wall sections using varied materials, i.e., dimension lumber products, steel stud framing for use by various trades including but not limited to, plumbing, electrical, HVAC, finish carpentry, lath plaster and drywall, framing, glazing, veneers, waterproofing, roofing, sheet metal, concrete etc. Students will use these skills to complete the capstone project. Math skills used will include applied geometry related to the angles of roof pitches, wall angles, finish trim, etc. They will also understand the connection between fractions and decimals and how they relate to the construction process.

B. 1. Create a model Cabinet: Using student provided construction drawings, students will construct a model cabine using sections to practice various trade skills by installing necessary components of a structure including but not limited to: joinery methods, hardware preparation and assembly, lamination and cabinet finishing techniques. This work allows students to apply geometric concepts such as the reading of an angle necessary to produce cabinetry, shelving, doors and countertops by measuring and cutting of angles necessary for a finished carpentry product. This work ultimately prepares students for the work of the culminating project in which they design and build their own small sustainable structure. The complete project should be square and level.

2. Drafting: Continuing to develop their skills in design, students will create their own design plan that includes a material list, cost estimate, and project schedule. Students will read existing construction drawings (which includes interpreting lines, symbols and abbreviations) to further understand how they are put together. They then use hand tools to design their own new simple structure. This work gives students a chance to apply geometric concepts to create the drawing such as the Pythagorean theorem to design (and eventually construct) their own cabinetry. Historical Analysis of Architectural Styles:Using different sets of historical plans, students will compare and contrast changes in architectural styles and engineering/structural requirements. In addition, students will perform a cost analysis regarding plans from different historical eras and submit revised estimates and opinions in the form of a brief report that explains

why the costs have increased so significantly from one era to another (increases in materials, labor, new building codes, inflation, etc). This work allows students to make connections between historical and current trends in architecture and construction in order to aid in decision making.

Unit 3: **Cabinet Structure** *(7 weeks)*

STANDARDS
Building and Construction Anchor Standards: 1.0, 2.5, 2.6, 3.7, 4.5, 5.1, 5.2, 6.3, 6.4, 6.6,
Cabinetry, Millwork and Woodworking Pathway Standards:A5.1, A5.2, A5.3, A5.6, A5.11, A5.12, A7.1, A7.2, A7.7, A10.1, A10.4, A10.5, A11.1
Common Core State Standards: RLST 11-12.10, F-TF 1.1, G-C 1, G-GMD 1, 4, 5, G-GPE 5, 7

A. The students will design a structure and develop construction documents for a cabinetry unit. Examples would include kitchen cabinets, bathroom cabinets, or a free standing storage cabinet. The design should include a variety of geometric shapes and should require applied mathematical skills and concepts in order to complete construction. To complete their design, students review specific geometric concepts including understanding the definitions of point, line, line segment, ray, plane, angle, vertex, diameter, radius, and circumference including circular shapes and where other circular shapes fit inside of them. Students apply the area formulas for circles and cylinders and use knowledge of precise measurement of angles using a protractor and angle bisectors using a compass to complete their construction project.

B. Create Construction Documents: Building on what they learned creating cabinets and drafting, students create a set of construction documents for their cabinet structure that should include a front view, side view, top view, materials list and cost, and a written proposal (see below) that identifies the advantages of their design. The drawings must have dimensions in both standard and metric, calculated angles, an accurate and labeled scale, and any other pertinent information. Students should include a variety of geometric shapes in order to challenge their design and layout skills. The final project drawings should have detailed labels and dimensions, stressing the importance of accuracy in design and mathematical calculations. After the documents have been approved by the instructor, the cabinets will be built. Written proposal for client: The audience for the proposal should be a potential client. In the proposal, students should highlight the advantages of their design and persuade the reader that their particular structure is going to meet the specific needs of a potential client. The document should include justification for the types of materials used and estimate the amount of hours of labor required for assembly.

Unit 4: **American Labor History** *(6 weeks)*

STANDARDS
Building and Construction Anchor Standards: 1.0, 2.5, 3.3, 3.4, 3.7, 3.8, 3.9, 5.1, 6.1, 6.11, 7.7, 7.8, 8.1, 8.2, 9.2, 9.3, 10.1, 11.1
Building and Construction Pathway Standards: AA3.1, A3.2, A4.3, A8.3, A8.4, A9.6, A10.5, A11.4,
Common Core State Standards: RSIT 11-12.2, 11-12.7, 11-12.10, RHSS 11-12.7, RLST 11-12.2A-REI 10, G-C1, G-GPE 5

A. Students will work collaboratively in teams and respond to a given prompt related to the political, economic, and social conditions that have influenced American labor history and current labor laws. Students will write a research essay, write blog posts and comment on those of peers, and make in-class presentations. Students will learn research, organization, and presentation skills as those skills apply to students showcasing their knowledge of American labor history as well as current labor laws.

B. 1. Research Essay: In order to gain a deeper understanding of the historical situations and issues that have led to the creation of current labor laws, students will research a given era to identify key leaders and major movements, focusing on their influence throughout history. Topics include the significance of apprenticeships, heritage of craft unions and symbols, the progression of working conditions, collective bargaining and economic and social justice.

2. Presentation: Students present the key findings of their research essay in a 3-5 minute multimedia format (PowerPoints, Prezis, posters, videos, or other platform) and provide an overview of evidence collected including the identification of key leaders and their impact on major labor movements for the given era, a description of the political, economic and social implications of the leaders and movements, and labor law and contemporary application. Presentations are intended to demonstrate a deeper understanding of the labor history movement, demonstrate mastery of research, organizational, and presentation skills, and the effective use of academic language in the oral presentation. Students will present to classmates and a panel of Advisors including teachers, peers, building trades professionals and other community partners as appropriate.

Unit 5: **Capstone Project** *(12 weeks)*

STANDARDS
Building and Construction Anchor Standards:
Building and Construction Pathway Standards: A6.1, A6.2, A6.8, A6.9, A6.10, A6.11, A7.5, A7.6, A7.7, A7.8, A7.10, A 7.11, A8.3, A8.4, A9.2, A9.3, A9.4, A10.1, A10.2, A10.3, A11.1, A11.2
Common Core State Standards: RSIT 11-12.2, 11-12.10, RLST 11-12.2, RLST 11-12.10, A-REI 10, G-C1, G-GPE 5

A. Students will design and build a scaled sustainable structure that encompasses the

multiple facets of the building and construction trades. Examples of a capstone project may include a tiny home, structure on a trailer, shed, or office space. The interior of the sustainable structure could be a work area or living habitat with finished walls, flooring system, and cabinetry. The sustainable capstone structure requires that a broad variety of the trades be represented and may include skills for rough framing, roofing, doors and windows, insulation, electrical systems, finish carpentry, plumbing systems, roofing, sheet metal, glazing, concrete, painting, solar power system, and HVAC. Design parameters will meet current building code and Title 24 requirements per the local municipality. Students will follow a Critical Path schedule for completion of the project and will maintain daily logs and workplace documentation.

B. 1. Design and Build a piece of furniture: To begin, students will create a packet of construction drawings for approval, similar to what may be submitted before construction can begin. The construction drawings will include a 3 view full scale drawing, materials list and cut list. These will be produced either by hand. After teacher approval, students build the structure. In both the design and build of the furniture, students use applied geometry to determine measurements for the furniture piece. Estimation skills utilize multiplication, addition, subtraction, division, etc. After instruction, students apply skills in determining quantities of cubic yards, square yards, cubic feet, volume, etc. Conversion techniques are utilized in the creation of a plan for a constructed project when using dimensional measurements and when transferring plans and calculations to a physical project. One must also be able to calculate the area of triangles and quadrilaterals to ensure everything is plumb, level and square. The Pythagorean Theorem must be used in theory and application through construction of woodworking projects, such as right triangle shelf-supports. The students must also be able to use calculating concepts of measuring volume in woodworking and construction, such as when using the volumetric unit "board foot."

2. Technical writing: Students will use their knowledge of labor law (unit 4) to create documents within the project package that include a bill of materials, vendor list, estimates, purchase orders, and labor costs. They will also be responsible for researching and listing the components in a project package such as contract documents, payment schedules, scopes of work, material safety data sheets (MSDS) licensing documentation, proper insurance documents, workers' compensation, liability, job safety analysis worksheets, etc. All written components of the package must be written to technical industry standards, which stress clarity and organization.