TOWNSHIP OF UNION PUBLIC SCHOOLS

DRAFTING AND DESIGN / CAD III
TE 350

Curriculum Guide

Curriculum Guide Approved June 2015

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DRAFTING AND DESIGN / CAD III
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Curriculum Committee Members

Edwin Oyola

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Mission Statement

The Township of Union Board of Education believes that every child is entitled to an education designed to meet his or her individual needs in an environment that is conducive to learning. State standards, federal and state mandates, and local goals and objectives, along with community input, must be reviewed and evaluated on a regular basis to ensure that an atmosphere of learning is both encouraged and implemented. Furthermore, any disruption to or interference with a healthy and safe educational environment must be addressed, corrected, or when necessary, removed in order for the district to maintain the appropriate educational setting.

Philosophy Statement

The Township of Union Public School District, as a societal agency, reflects democratic ideals and concepts through its educational practices. It is the belief of the Board of Education that a primary function of the Township of Union Public School System is to formulate a learning climate conducive to the needs of all students in general, providing therein for individual differences. The school operates as a partner with the home and community.

Statement of District Goals

- Develop reading, writing, speaking, listening, and mathematical skills.
- Develop a pride in work and a feeling of self-worth, self-reliance, and self-discipline.
- Acquire and use the skills and habits involved in critical and constructive thinking.
- Develop a code of behavior based on moral and ethical principles.
- Work with others cooperatively.
- Acquire a knowledge and appreciation of the historical record of human achievement and failures and current societal issues.
- Acquire a knowledge and understanding of the physical and biological sciences.
- Participate effectively and efficiently in economic life and the development of skills to enter a specific field of work.
- Appreciate and understand literature, art, music, and other cultural activities.
- Develop an understanding of the historical and cultural heritage.
- Develop a concern for the proper use and/or preservation of natural resources.
- Develop basic skills in sports and other forms of recreation

Course Description

DRAFTING & DESIGN / CAD III - Architecture

Enrollment: Grades 11 - 12
(prerequisites: Drafting & Design CAD I, CAD II)

Purpose and Overview

CAD III - Architecture
After a brief introduction to architecture in the second level course, the student will enhance skills required to develop and produce a set of working drawings for a single family residential structure. The student will be introduced to the construction industry, building techniques and blue print reading. Development of a set of plans that include: sectional plans, foundation and floor plans, elevations, dimensioning and electrical plans, a plot plan, window and door schedules, perspective rendering and a variety of detail drawings will be completed. The experience will culminate in the construction of a scale model of the students design.

Recommended Textbooks

Drafting and Design for Architecture & Construction – Donald Hepler, Paul Wallach, Dana Hepler, DelmarCengage Learning
9th Edition

AutoCAD and Its Applications: Comprehensive 2015 – Terence M Shumaker, David P. Madsen, Jeffrey A. Laurich, J.C. Malitzke, and Craig P. Black
22nd Edition

Course Proficiencies

Students will be able to…

CAD III

At the completion of CAD III the student will demonstrate:

1. an advanced knowledge of AutoCAD.
2. the ability to construct industry grade architectural working drawings in the areas listed.
3. the ability to problem solve higher level projects
4. the ability to work in cooperative teams
5. the proper care for the computer and peripherals and equipment
6. appropriate classroom rules and regulations

Curriculum Units

Unit 1: Advanced Architecture

Unit 2: Preliminary Design and Planning

Unit 3: Area Planning

Unit 4: Basic Architectural Plans

Unit 5: Technical Architectural Plans

Unit 6: Architectural Support Services

Unit 7: Deck Design

Unit 8: Kitchen Designs

Unit 9: Wall Framing

Unit 10: Roof framing

Unit 11: Site development

Unit 12: Advanced Architectural models

Pacing Guide- Course

Content			Number of Days
Unit 1:	Advanced Architecture	1 week block	5 days
Unit 2:	Preliminary Design and Planning	2 week block	10 days
Unit 3:	Area Planning	2 week block	10 days
Unit 4:	Basic Architectural Plans	2 week block	10 days
Unit 5:	Technical Architectural Plans	3 week block	15 days
Unit 6:	Architectural Support Services	3 week block	15 days
Unit 7:	Deck Design	3 week block	15 days
Unit 8:	Kitchen Designs	4 week block	20 days
Unit 9:	Wall Framing	4 week block	20 days
Unit 10:	Roof framing	4 week block	20 days
Unit 11:	Site development	3 week block	15 days
Unit 12:	Advanced Architectural model	2 week block	10 days

33 weeks +/-

3 weeks +/- testing, assessments, writing

Unit 1;

Essential Questions	Instructional Objectives/ Skills and Benchmarks *(CPIs)*	Activities	Assessments
When high rise building did come about? What makes up a commercial structure? What are some types of design used for commercial specification? Why are some famous structures around the world one of a kind? What are some of the names of big retailers that have 500 or more retail locations?	**SWAT:** Understand the history of steel. Understand different building styles. Understand the development of steel structural design. Understand technological advances in wood and steel materials. Identify new materials in construction Understand new construction methods Understand the future of architecture and how it will affect society **9.3.12.AC.1** **9.3.12.AC.6** **9.3.12.AC-CST.1** **9.3.12.AC-CST.6** **9.3.12.AC-DES.4**	Design a 12 story high rise building using just steel and glass. Construct a 3d model a steel skeleton of a strip mall. Research samples of architectural materials used in the building, structural, industries.	• Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 2;

Essential Questions	Instructional Objectives/ Skills and Benchmarks *(CPIs)*	Activities	Assessments
Name three fundamentals of design? What is a traffic pattern? What areas should be incorporated in your design? What environmental factors should be considered? How does ecology play a role in house design?	**SWAT:** Fundamentals of designing and planning Architectural Styles and Types Design factors Environmental Factors in Design Energy Planning and Orientation Ecology Planning **9.3.12.AC.2** **9.3.12.AC.3** **9.3.12.AC-CST.2** **9.3.12.AC-CST.4** **9.3.12.AC-DES.3**	Develop a floor plan that has incorporated the proper design factors. List several ecological factors that must be considered in developing a structure. Assign students a variety of drawing problems to show proficiency.	• Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 3;

Essential Questions	Instructional Objectives/ Skills and Benchmarks *(CPIs)*	Activities	Assessments
What are the main design areas in a house? What is the difference between noise areas, quiet areas and utility areas? What items are considered utility? What is a traffic pattern?	**SWAT:** Understand the concepts and utilize the following: • Living Area • Living Room • Dining Room • Family Room • Recreation Room • Kitchens • Bath Rooms • Traffic Patterns • Multi-Function Rooms • Utility Rooms • Garages • Storage Areas • Entrance Areas **9.3.12.AC.2** **9.3.12.AC.4** **9.3.12.AC-CST.4** **9.3.12.AC-CST.7** **9.3.12.AC-DES.5**	Utilize proper design components to design each area. Assign students a variety of drawing problems to show proficiency.	• Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 4;

Essential Questions	Instructional Objectives/ Skills and Benchmarks *(CPIs)*	Activities	Assessments
Why are floor plans necessary? What goes into the designing of a floor plan? How does architectural dimensioning differ from mechanical drawing dimensioning? What is an elevation drawing? Why would you need a pictorial rendering of your home?	**SWAT:** Drawing Floor Plans • Functional Room Planning • Floor Plan Design • Complete Floor Plan • Floor Plan Dimensioning Elevation Drawings • Elevation Design • Elevation Projection • Elevation Symbols • Elevation Dimensioning Pictorial Drawings • Two Point Perspective **9.3.12.AC.1** **9.3.12.AC.6** **9.3.12.AC-CST.4** **9.3.12.AC-CST.7**	Utilize proper design components to design each area. Develop a floor plan. Assign students a variety of drawing problems to show proficiency.	• Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 5:

Essential Questions	Instructional Objectives/ Skills and Benchmarks *(CPIs)*	Activities	Assessments
What types of drawings go into a set of architectural plans? Why are so many needed? Why are plans needed? Who approves drawings so a house can be built? Name the different trades people who are involved in the construction of a house.	**SWAT:** Location Plans • Plot Plans • Landscape Plans • Survey Plans Foundation Plans • Foundation Members • Foundation Types • Foundation Drawings • Fireplaces Framing Plans • Types of Framing • Floor Framing Plans • Exterior Wall Framing • Interior Wall Framing • Stud Layout • Roof Framing Plans Electrical Plans • Lighting • Electrical Principles • Electrical Symbols **9.3.12.AC.2** **9.3.12.AC.4** **9.3.12.AC-CST.7** **9.3.12.AC-DES.4**	Research and develop a complete set of drawings for a simple structure. Research local officials who work in the building department. Assign students a variety of drawing problems to show proficiency.	• Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 6;

Essential Questions	Instructional Objectives/ Skills and Benchmarks *(CPIs)*	Activities	Assessments
What is the purpose of schedules? What information is contained in schedules? What terminology is used with schedules? Can you name 4 different types of schedules?	**SWAT:** Understand the concept and represent the following: • Schedules and Specifications • Door and Window Schedules • Finish Schedules • Specifications • Building Codes • Required Sizes • Loads **9.3.12.AC.1** **9.3.12.AC.6** **9.3.12.AC-CST.8** **9.3.12.AC-DES.7**	Students will develop a variety of schedules to comply with standard working drawings. Match the schedule to your specific drawing. Assign students a variety of drawing problems to show proficiency.	• Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 7;

Essential Questions	Instructional Objectives/ Skills and Benchmarks *(CPIs)*	Activities	Assessments
How many students have a deck attached to their house? Who designed it? What specifications are required?	**SWAT:** Understand the step by step procedure in deck design and building including the following: • Building codes • Design • Components • Hardware • Footings • Railings • Stairs and components **9.3.12.AC.2** **9.3.12.AC.6** **9.3.12.AC-CST.4** **9.3.12.AC-CST.7** **9.3.12.AC-DES.2**	Research deck design. Research local building codes Research deck components. Develop a deck design to be placed on an existing structure. Develop a cost profile for the deck design based on current material prices.	• Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 8;

Essential Questions	Instructional Objectives/ Skills and Benchmarks *(CPIs)*	Activities	Assessments
How deep is a standard wall cabinet? What is the working height for a standard kitchen cabinet? What is the term for an imaginary line connecting the three major kitchen centers? How wide counter top of a standard kitchen cabinet?	**SWAT:** Understand the step by step procedure in kitchen design including the following: • Building codes • Design • Components • Types of cabinets • Types of accessories • Standard sizes • Work triangle • Traffic patterns • Fit and finishes • Cost **9.3.12.AC.2** **9.3.12.AC.6** **9.3.12.AC-CST.4** **9.3.12.AC-CST.7** **9.3.12.AC-DES.2**	Research kitchen design. Determine the best shape, size, and location for the kitchen. Research kitchen components. Develop a kitchen design to be placed on an existing structure. Develop a cost profile for the kitchen design based on current material prices.	• Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 9;

Essential Questions	Instructional Objectives/ Skills and Benchmarks *(CPIs)*	Activities	Assessments
What may be used for exterior wall cover? What type of working drawing is usually used for wall framing? The rough openings for windows and doors must be? What is the purpose of a let-in brace?	**SWAT:** Understand and gather information to designing a wall framing drawing. Identify and use the design process to prepare a functional wall. Analyze a structure to determine size of materials. Understand the concept framing system. **9.3.12.AC.2** **9.3.12.AC.6** **9.3.12.AC-CST.4** **9.3.12.AC-CST.7** **9.3.12.AC-DES.2**	Draw details and sections of walls. Draw wall intersections. Draw an interior wall framing elevation and plan. Draw an exterior wall framing elevation and plan.	• Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 10;

Essential Questions	Instructional Objectives/ Skills and Benchmarks *(CPIs)*	Activities	Assessments
What is the highest structural member in roof construction? What is a bird mouth cut? What is ledger strip? Specify the type of roofing to be used in the house of your design? Name the main parts of a roof truss? List the advantages of using trusses.	**SWAT:** Describe roof framing members, components and methods. Understand how roof appendages are used. Know roof covering material options. Know how to use the formula to get the roof slope and pitch. Understand roof framing methods using steel. **9.3.12.AC.2** **9.3.12.AC.6** **9.3.12.AC-CST.4** **9.3.12.AC-CST.7** **9.3.12.AC-DES.2**	Draw roof framing details and elevations. Draw a roof framing plan showing structural members, sizes, pitch, and spacing. Calculate roof pitch.	• Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 11;

Essential Questions	Instructional Objectives/ Skills and Benchmarks *(CPIs)*	Activities	Assessments
Which laws regulate the uses of a site in order to preserve public safety? Name the three major zones into which most municipalities are divided? What is the term for the ratio of all inhabitants to a space in a specific geographic area? What drawing shows the exact size, shape, and levels of a site?	**SWAT:** Understand the relationship of topography to all site plans. Identify the major elements used in site design. Understand the role and uses of zoning ordinances in the design process. Understand the polar coordinate system and its application to site plans. **9.3.12.AC.1** **9.3.12.AC.2** **9.3.12.AC.6** **9.3.12.AC-CST.4** **9.3.12.AC-DES.2** **9.3.12.AC-DES.4**	Draw a survey, plat, and plot plan. Design, draw, and render landscape plans and elevations. Match the descriptions with map elements.	• Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

Unit 12;

Essential Questions	Instructional Objectives/ Skills and Benchmarks *(CPIs)*	Activities	Assessments
What is the difference between a paper and wood model? Describe which model is easier to construct? What features are shown in one and not on the other? Which type of model is least expensive to build?	**SWAT:** Understand design and materials. Explain the differences between presentation and design study models. Describe architectural models made for design study purposes. List the steps for creating a model. **9.3.12.AC.2** **9.3.12.AC.5** **9.3.12.AC.6** **9.3.12.AC-CST.3** **9.3.12.AC-CST.4** **9.3.12.AC-CST.8**	Design and study models. Complete a computer model of a town house you may want to build.. Construct a town house model.	• Teacher observations • Presentations • Projects • Rubrics • Checklists • Tests / quizzes • Self-evaluation

New Jersey Core Curriculum Content Standards
Academic Area

9.3- Career & Technical Education (CTE)
Content Area: 21st Century Life and Careers

CONTENT AREA:	STANDARD 9.3 CAREER AND TECHNICAL EDUCATION
ARCHITECTURE & CONSTRUCTION CAREER CLUSTER	
Number	Standard Statement
By the end of Grade 12, Career and Technical Education Program completers will be able to:	
Career Cluster:	**Architecture & Construction (AC)**
9.3.12.AC.1	Use vocabulary, symbols and formulas common to architecture and construction.
9.3.12.AC.2	Use Architecture and construction skills to create and manage a project.
9.3.12.AC.3	Comply with regulations and applicable codes to establish and manage a legal and safe workplace.
9.3.12.AC.4	Evaluate the nature and scope of the Architecture & Construction Career Cluster and the role of architecture and construction in society and the economy.
9.3.12.AC.5	Describe the roles, responsibilities, and relationships found in the architecture and construction trades and professions, including labor/management relationships.
9.3.12.AC.6	Read, Interpret and use technical drawings, documents and specifications to plan a project.
9.3.12.AC.7	Describe career opportunities and means to achieve those opportunities in each of the Architecture & Construction Career Pathways.

PATHWAY:	Construction (AC-CST)
9.3.12.AC-CST.1	Describe contractual relationships between all parties involved in the building process.
9.3.12.AC-CST.2	Describe approval procedures required for successful completion of a construction project.
9.3.12.AC-CST.3	Implement testing and inspection procedures to ensure successful completion of a construction project.
9.3.12.AC-CST.4	Apply scheduling practices to ensure the successful completion of a construction project.
9.3.12.AC-CST.5	Apply practices and procedures required to maintain jobsite safety.
9.3.12.AC-CST.6	Manage relationships with internal and external parties to successfully complete construction projects.
9.3.12.AC-CST.7	Compare and contrast the building systems and components required for a construction project.
9.3.12.AC-CST.8	Demonstrate the construction crafts required for each phase of a construction project.
9.3.12.AC-CST.9	Safely use and maintain appropriate tools, machinery, equipment and resources to accomplish construction project goals.
PATHWAY:	**Design/Pre-Construction (AC-DES)**
9.3.12.AC-DES.1	Justify design solutions through the use of research documentation and analysis of data.
9.3.12.AC-DES.2	Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues.
9.3.12.AC-DES.3	Describe the requirements of the integral systems that impact the design of buildings
9.3.12.AC-DES.4	Apply building codes, laws and rules in the project design.
9.3.12.AC-DES.5	Identify the diversity of needs, values and social patterns in project design, including accessibility standards.

9.3.12.AC-DES.6	Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
9.3.12.AC-DES.7	Employ appropriate representational media to communicate concepts and project design.
9.3.12.AC-DES.8	Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design
PATHWAY:	**Maintenance/Operations (AC-MO)**
9.3.12.AC-MO.1	Recognize and employ universal construction signs and symbols to function safely in the workplace.
9.3.12.AC-MO.2	Use troubleshooting procedures when solving a maintenance problem in buildings.
9.3.12.AC-MO.3	Apply construction skills when repairing, restoring or renovating existing buildings.
9.3.12.AC-MO.4	Determine work required to repair or renovate an existing building.
9.3.12.AC-MO.5	Plan and practice preventative maintenance activities to service existing buildings.
9.3.12.AC-MO.6	Maintain and inspect building systems to achieve safe and efficient operation of buildings.

New Jersey Scoring Rubric

New Jersey Registered Holistic Scoring Rubric - GEPA/HSPA

In Scoring, consider the grid of written language	Inadequate Command	Limited Command	Partial Command	Adequate Command	Strong Command	Superior Command
Score	1	2	3	4	5	6
Content & Organization	• May lack opening and/or closing	• May lack opening and/or closing	• May lack opening and/or closing	• Generally has opening and/or closing	• Opening and closing	• Opening and closing
.	• Minimal response to topic; uncertain focus	• Attempts to focus • May drift or shift focus	• Usually has single focus	• Single focus	• Single focus • Sense of unity and coherence • Key ideas developed	• Single, distinct focus • Unified and coherent • Well-developed
.	• No planning evident; disorganized	• Attempts organization • Few, if any, transitions between ideas	• Some lapses or flaws in organization • May lack some transitions between ideas	• Ideas loosely connected • Transition evident	• Logical progression of ideas • Moderately fluent • Attempts compositional risks	• Logical progression of ideas • Fluent, cohesive • Composi-tional risks successful
.	• Details random, inappropriate, or barely apparent	• Details lack elaboration, i.e., highlight paper	• Repetitious details • Several unelaborated details	• Uneven development of details	• Details appropriate and varied	• Details effective, vivid, explicit, and/or pertinent
Usage	• No apparent control • Severe/ numerous errors	• Numerous errors	• Errors/ patterns of errors may be evident	• Some errors that do not interfere with meaning	• Few errors	• Very few, if any, errors
Sentence Construc-tion	• Assortment of incomplete and/or incorrect sentences	• Excessive monotony/ same structure • Numerous errors	• Little variety in syntax • Some errors	• Some errors that do not interfere with meaning	• Few errors	• Very few, if any, errors
Mechanics	• Errors so severe they detract from meaning	• Numerous serious errors	• Patterns of errors evident	• No consistent pattern of errors • Some errors that do not interfere with meaning	• Few errors	• Very few, if any, errors

Holistic Scoring Guide for Mathematics Open-Ended (OE) Items
(Generic Rubric)

3 - Point Response
The response shows complete understanding of the problem's essential mathematical concepts. The student executes procedures completely and gives relevant responses to all parts of the task. The response contains few minor errors, if any. The response contains a clear, effective explanation detailing how the problem was solved so that the reader does not need to infer how and why decisions were made.

2 - Point Response
The response shows nearly complete understanding of the problem's essential mathematical concepts. The student executes nearly all procedures and gives relevant responses to most parts of the task. The response may have minor errors. The explanation detailing how the problem was solved may not be clear, causing the reader to make some inferences.

1 - Point Response
The response shows limited understanding of the problem's essential mathematical concepts. The response and procedures may be incomplete and/or may contain major errors. An incomplete explanation of how the problem was solved may contribute to questions as to how and why decisions were made.

0 - Point Response
The response shows insufficient understanding of the problem's essential mathematical concepts. The procedures, if any, contain major errors. There may be no explanation of the solution or the reader may not be able to understand the explanation. The reader may not be able to understand how and why decisions were made.