PATERSON PUBLIC SCHOOLS
Preparing All Children for College and Career

Department of College and Career Readiness

Drafting- Architectural Curriculum

5.0 Credits

Unit Four

Drafting- Architectural

Course Description

Architectural Drafting and Design is a full year course offered to a range of students from sophomores to seniors. It is designed to provide students the opportunity to expand their drafting skills mechanically. In-depth lessons allow students to build the skills to think critically and provides them with information needed to have self-directed learning. Students practice different skills using the computer aided drafting program called AutoCAD. They start the course by learning the basics of the program itself. They then expand and use their knowledge of the program to create architectural and industrial designs. They learn about the different fields of work that use the program, and are able to decide is this is something they would like to pursue in their future career path. Each lesson contains a suggested time length, and daily behavioral objectives.

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Drafting- Architectural

Pacing Guide		
Unit	**Topic**	**Suggested Timing**
Unit 1	Introduction to Architectural Drafting and Design- AutoCAD	approx. 9 weeks
Unit 2	Basic Skills to Create Drawings	approx. 9 weeks
Unit 3	Basic Skills to Edit Drawings	approx. 10 weeks
Unit 4	Real Life applications using AutoCAD	approx. 7 weeks

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Educational Technology Standards
8.1.12.A.1, 8.1.12.A.2, 8.1.12.D.1, 8.1.12.D.5, 8.1.12.F.1

➤ **Technology Operations and Concepts**
- Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
- Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.

➤ **Digital Citizenship**
- Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.
- Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.

➤ **Critical Thinking, Problem Solving, Decision Making**
- Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

Career Ready Practices

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

CRP1. Act as a responsible and contributing citizen and employee
Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

CRP2. Apply appropriate academic and technical skills.
Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.

CRP3. Attend to personal health and financial well-being.
Career-ready individuals understand the relationship between personal health, workplace performance and personal well-being; they act on that understanding to regularly practice healthy diet, exercise and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial well-being, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.

CRP4. Communicate clearly and effectively and with reason.
Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

CRP5. Consider the environmental, social and economic impacts of decisions.
Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.

CRP6. Demonstrate creativity and innovation.
Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

CRP7. Employ valid and reliable research strategies.
Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

CRP9. Model integrity, ethical leadership and effective management.
Career-ready individuals consistently act in ways that align personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others' action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morals and organizational culture.

CRP10. Plan education and career paths aligned to personal goals.
Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.

CRP11. Use technology to enhance productivity.
Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.

CRP12. Work productively in teams while using cultural global competence.
Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

Differentiated Instruction

Strategies to Accommodate Students Based on Individual Needs

Time/General	Processing	Comprehension	Recall
• Extra time for assigned tasks • Adjust length of assignment • Timeline with due dates for reports and projects • Communication system between home and school • Provide lecture notes/outline	• Extra Response time • Have students verbalize steps • Repeat, clarify or reword directions • Mini-breaks between tasks • Provide a warning for transitions • Reading partners	• Precise step-by-step directions • Short manageable tasks • Brief and concrete directions • Provide immediate feedback • Small group instruction • Emphasize multi-sensory learning	• Teacher-made checklist • Use visual graphic organizers • Reference resources to promote independence • Visual and verbal reminders • Graphic organizers
Assistive Technology	**Tests/Quizzes/Grading**	**Behavior/Attention**	**Organization**
• Computer/whiteboard • Tape recorder • Spell-checker • Audio-taped books	• Extended time • Study guides • Shortened tests • Read directions aloud	• Consistent daily structured routine • Simple and clear classroom rules • Frequent feedback	• Individual daily planner • Display a written agenda • Note-taking assistance • Color code materials

Enrichment

Strategies Used to Accommodate Based on Students Individual Needs:

- Adaption of Material and Requirements

- Evaluate Vocabulary

- Elevated Text Complexity

- Additional Projects

- Independent Student Options

- Projects completed individual or with Partners

- Self Selection of Research

- Tiered/Multilevel Activities

- Learning Centers

- Individual Response Board

- Independent Book Studies

- Open-ended activities

- Community/Subject expert mentorships

Assessments

Suggested Formative/Summative Classroom Assessments

- Drawings

- Teacher-created Unit Assessments, Chapter Assessments, Quizzes

- Teacher-created DBQs, Essays, Short Answer

- Accountable Talk, and Share

- Projects, Portfolio

- Homework

- Concept Mapping

- Primary and Secondary Source analysis

- Create an Original Song, Film, or Poem

- Performance Tasks

- Explanations of examples

- Individual Practice

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Interdisciplinary Connections

English Language Arts
- Journal writing
- Close reading of industry-related content
- Keep a running word wall of industry vocabulary

Social Studies
- Research the history of a given industry/profession
- Use historical references to solve problems

World Language
- Translate industry-content
- Create a translated index of industry vocabulary
- Generate a translated list of words and phrases related to workplace safety

Math
- Go on a geometry scavenger hunt
- Anchor charts for area and perimeter

Fine & Performing Arts
- Create a poster recruiting young people to focus their studies on a specific career or industry
- Design a flag or logo to represent a given career field

Science
- Research the environmental impact of a given career or industry
- Research latest developments in industry technology
- Investigate applicable-careers in STEM fields

New Jersey Student Learning Standards

9.3– Career and Technical Education

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: Design/ Pre-Construction (AC-DES)

- AC-DES.1: Justify design solutions through the use of research documentation and analysis of data.
- AC-DES.2: Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues.
- AC-DES.3: Describe the requirements of the integral systems that impact the design of buildings.
- AC-DES.4: Apply building codes, laws and rules in the project design.
- AC-DES.5: Identify the diversity of needs, values and social patterns in project design, including accessibility standards.
- AC-DES.6: Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
- AC-DES.7: Employ appropriate representational media to communicate concepts and project design.
- AC-DES.8: Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.

Common Career Technical Core (CCTC)

Career Cluster Architecture & Construction

AC 1 – Use vocabulary, symbols and formulas commonly used in design and construction.

- AC 1.1 – Match vocabulary and visual cues to workplace/jobsite situations.
- AC 1.2 – Utilize vocabulary and visual cues in context of design and construction situations.

AC 2 – Use architecture and construction skills to create and manage a project.

- AC 2.1 – Manage the schedule of a project/job.
- AC 2.5 – Plan, organize, schedule and manage a project/job to optimize workflow and outcome.

AC 4 – Understand the nature and scope of the Architecture &Construction Career Cluster and the role architecture and construction play in society and the economy.

- AC 4.1 – Describe how relationships between trades/professions can facilitate smooth workflow and outcome to meet project goals.

AC 6 - Read, interpret, and use technical drawings, documents and specifications to plan a project.

- AC 6.1 – Interpret drawings used in project planning.
- AC 6.2 -- Recognize how specifications and standards are arranged for proper access.
- AC 6.3 -- Use architect's plan, manufacturer's illustrations and other materials to communicate specific data and visualize proposed work.

Common Core State Standards (CCSS)

CCSS - English-Language Arts

Key Ideas and Details:

- CCSS.ELA-LITERACY.RI.11-12.3 Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.

Integration of Knowledge and Ideas:

- CCSS.ELA-LITERACY.RI.11-12.7: Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

Research to Build and Present Knowledge:
- CCSS.ELA-LITERACY.W.11-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Common Core State Standards (CCSS)

CCSS - Mathematics

Understand and apply theorems about circles
- CCSS.MATH.CONTENT.HSG.C.A.2 Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.
- CCSS.MATH.CONTENT.HSG.C.A.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.
- CCSS.MATH.CONTENT.HSG.C.A.4 (+) Construct a tangent line from a point outside a given circle to the circle.

Apply geometric concepts in modeling situations
- CCSS.MATH.CONTENT.HSG.MG.A.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).*
- CCSS.MATH.CONTENT.HSG.MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).*
- CCSS.MATH.CONTENT.HSG.MG.A.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).*

Course: Drafting-Architectural	Unit Overview: Students will be given different real life scenarios to use in AutoCAD.
Unit 4– Real Life Application using AutoCAD	
Grade Level: 9-12	

New Jersey Student Learning Standards (NJSLS): 9.3.12.AC.2, 9.3.12.AC.5, 9.3.12.AC.7, 9.3.12.AC-DES.6	

Common Career Technical Core (CCTC): AC 2.1, AC 2.5, AC 4.1, AC 6.1, AC 6.2, AC 6.3

Common Core State Standards (CCSS):

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
To analyze and create an object in the classroom **NJSLS:** 9.3.12.AC.2, 9.3.12.AC.5, 9.3.12.AC-DES.6 **CCTC:** AC 2.1, AC 2.5 **CCSS:** W.11-12.7, HSG.MG.A.3	What responsibilities come with the freedom to create? How do objects, places, and design shape lives and communities? How do Architects design drawings that effectively communicate what they are trying to portray?	• Identify timeline required to complete a project/job. • Evaluate efficiency and effectiveness of a project/job. • Adjust project plans to reflect an unexpected change. • Report results of the project/job.	**Journal** Students will write in their journals about what they might want to draw or recreate **Create Graphic Organizer** Students will create an organizer to determine what they would like to recreate **Timeline**	**Convert 2D Objects to 3D Objects** https://knowledge.autodesk.com/support/autocad/learn-explore/caas/CloudHelp/cloudhelp/2016/ENU/AutoCAD-Core/files/GUID-ECFB3220-6484-4D0B-BB7E-B06AD9F4E856-htm.html **Drawing Objects** http://www.cadtutor.net/tutorials/autocad/drawing-

			Students will create a timeline of the product they choose to recreate and make drawing from different time periods to show how it has changed	objects.php **How to Create 3D Object AutoCAD 2015** https://www.youtube.com /watch?v=e4m5m394M7I
Research and Create blueprints of a building of choice. **NJSLS:** 9.3.12.AC.2, 9.3.12.AC.5, 9.3.12.AC-DES.6 **CCTC:** AC 6.1, AC 6.2, AC 6.3 **CCSS:** W.11-12.7, HSG.MG.A.3	How does learning about blueprints impact the way we relate to the real world? What is a blueprint? How can AutoCAD help you create a blueprint?	• Recognize elements and symbols of blueprints and drawings. • Use specifications and standards. • Apply specifications and standards appropriately. • Sketch/draw/illustrate concepts and ideas. • Draw or sketch plan/layout to be completed. • Use proper measurements to determine layout.	**Research** Students will research different building styles and write a mini paper on why they chose that building **Role Play** Students will pretend they are contractors and architects and the contractors will have to tell the architects what they want and the architects will have to design it **Poster** Students will create a poster explaining why they chose the type of building they chose and put their drawing on the	**What exactly is a blueprint?** http://science.howstuffwo rks.com/engineering/stru ctural/question321.htm **Commercial, Public & Industrial building Types** https://heritage.utah.gov/ history/commercial-public-industrial-building-types **Learning to Read a Blueprint with Thomas Kern** https://www.youtube.com /watch?v=eeqL0VlBOyE

				poster
Design and Asses a bridge blueprint of their own **NJSLS:** 9.3.12.AC.2, 9.3.12.AC.5 , 9.3.12.AC-DES.6 **CCTC:** AC 2.1, AC 6.1, AC 6.2, AC 6.3 **CCSS:** W.11-12.7, HSG.MG.A.3	Is there more then one way to build a bridge? Does the surroundings of the bridge depend on what kind of bridge you are designing? How would an architect determine if what they are creating will be effective?	• Recognize elements and symbols of blueprints and drawings. • Use specifications and standards. • Apply specifications and standards appropriately. • Sketch/draw/illustrate concepts and ideas. • Draw or sketch plan/layout to be completed. • Use proper measurements to determine layout. • Identify timeline required to complete a project/job. • Evaluate efficiency and effectiveness of a project/job. • Adjust project plans to reflect an unexpected change.	**Debate** Students will have debates/ discussions on what types of bridges they think are better **Case Study** Have a students research any bridge that has collapsed and see if they can figure out why? **Exit Tickets** Students will write down what kind of bridge they thought what the best	**6 Types of Bridges** https://sites.google.com/a/wyckoffschools.org/stem-grade-8/2-types-of-bridges **Types of Bridges** http://www.historyofbridges.com/facts-about-bridges/types-of-bridges/ **AutoCAD 18- Drawing an arch truss bridge part 1 of 2** https://www.youtube.com/watch?v=e92klD1U1jY
Specify what a dream invention would be and create a plan	How do people come up with inventions?	• Recognize elements and symbols of blueprints and	**Think Pair Share** Students will discuss some inventions that	**How to Think of an Invention** http://science.howstuffwo

NJSLS: 9.3.12.AC.2, 9.3.12.AC.7, 9.3.12.AC-DES.6 **CCTC:** AC 2.5, AC 6.1, AC 6.2, AC 6.3 **CCSS:** W.11-12.7, HSG.MG.A.3	What can we learn from other people's inventions? What is the purpose of inventions?	drawings. • Use specifications and standards. • * Apply specifications and standards appropriately. • Sketch/draw/illustrate concepts and ideas. • Draw or sketch plan/layout to be completed. • * Use proper measurements to determine layout. • Identify timeline required to complete a project/job. • Evaluate efficiency and effectiveness of a project/job.	they would like to build **Trifold Display** Students will use this display to present their invention and add the drawing of their invention **Essay** Students will write a short essay describing their invention, how it works, and why would this be something that they would want to invent.	rks.com/innovation/inventions/how-to-think-of-invention.htm **What are the best ways to think of invention ideas?** https://www.quora.com/What-are-the-best-ways-to-think-of-invention-ideas **Amazing Kid Inventions** https://www.youtube.com/watch?v=QR_CfFuDWQ8
Review ways that AutoCAD can be used in real life **NJSLS:** 9.3.12.AC.2, 9.3.12.AC.7, 9.3.12.AC-DES.6 **CCTC:** AC 4.1, AC 6.1 **CCSS:** W.11-12.7, HSG.MG.A.3	What is the purpose of using AutoCAD? How can AutoCAD be used outside of the classroom? Are there rules and regulations that need to be followed when	• Recognize elements and symbols of blueprints and drawings. • Coordinate work between trades.	**Journaling** Students will write in their journals about what they think AutoCAD can be used for **Research** Students will research how they would be able to use AutoCAD in a field	**Real World Scenario: Creating Schematic Duct Layouts before the Revit Model is Complete** https://knowledge.autodesk.com/support/revit-products/learn-explore/caas/CloudHelp/cloudhelp/2016/ENU/3P

			they would want to work in	P-REVMEP-MAS-Wiley/files/GUID-389B6A0E-2B6D-4F5A-B927-DDF064D43227-htm.html
			Interview Students will interview someone that uses AutoCAD on a daily basis to see how it can relate to their life	**Real World Construction Using AutoCAD** http://au.autodesk.com/au-online/classes-on-demand/class-catalog/2012/autocad-civil-3d/real-world-construction-using-autocad-civil-3d#chapter=0 **Three AutoCAD Skills for Real Life Work Situations** https://www.youtube.com/watch?v=n-IT5GCOb5w
building things on AutoCAD?				
Criticize and examine a premade blueprint NJSLS: 9.3.12.AC.2, 9.3.12.AC.7, 9.3.12.AC-DES.6	How does one determine criteria to evaluate a blueprint? How does knowing and using vocabulary in the program help understand	• Recognize elements and symbols of blueprints and drawings. • Use specifications and standards.	**Debate** Students can discuss what they think should stay or change in a blueprint, they can also discuss what they could do different	**Understanding Test Blueprints and their Impact on Student Growth** https://ohioedconference.files.wordpress.com/2013/10/lavender_shaw_blu

| CCTC: AC 6.1, AC 6.2, AC 6.3 CCSS: W.11-12.7, HSG.MG.A.3 | and interpret the drawings? How does location plays a roles in the building of something? | • Apply specifications and standards appropriately. • Sketch/draw/illustrate concepts and ideas. • Draw or sketch plan/layout to be completed. • Use proper measurements to determine layout. | **PowerPoint** Students will create a PowerPoint explaining what blueprints are and what are they used for **Stations** Students will go around the classroom looking at different blueprints and explaining what each blueprint is representing | eprintsstudentgrowth.pdf **Architecture & Construction Blueprints** http://www.nocti.org/BlueprintCategoryLinks.cfm?category=Architecture%20%26%20Construction **Tiny House Plans- Analyzing the Structure** https://www.youtube.com/watch?v=vV3b-EY_4EA |

Unit 4 Vocabulary	
Annotative Objects Arc Block Blueprint DIM Express Tools Model Space Multileaders Paper Space	Polyarc Polyline Prefix Purge Revision Cloud Spline Suffix Truss Viewport Wipe Out

Suggested Unit Projects
Choose At Least One

Interview an Architect and ask how they use the skills they learn in the work force.	Create a continuous drawing throughout the unit to showcase new skills learned.

Suggested Structured Learning Experiences

NJIT College of Architecture and Design University Heights Newark, New Jersey 07102 http://design.njit.edu/forstudents/mentor.php Art of New Jersey- Architecture of New Jersey Jacqueline Dow 775-725-1300 contact@artofnewjersey.net http://www.artofnewjersey.net/contact-us/	AIA New York Center for Architecture 536 LaGuardia Place, NY, NY 10012 Info@cfacoundations.org 212-358-6133 http://www.cfafoundation.org/exhibition-tours