PATERSON PUBLIC SCHOOLS

Preparing All Children for College and Career

Department of College and Career Readiness

Drafting - General Curriculum

5.0 Credits

Unit Three

PATERSON PUBLIC SCHOOLS

Preparing All Children for College and Career

Drafting - General

Course Description

This course involves a careful examination of drafting as a tool of technical communication and for solving graphical problems. Emphases are on development of basic drafting skills, visualization, and solution of spatial problems. It is an exploratory, first course in drafting designed primarily for students planning to enroll in the regular-program Drafting Technology courses upon completion of this course. However, it also meets the needs of many students with other interests, as a refresher course in drafting, a course for upgrading drafting skills, a course for engineering students training to be public school industrial arts teachers, or a course that provides students with a general "feel" for the subject of drafting.

Drafting – General

Pacing Guide		
Unit	**Topic**	**Suggested Timing**
Unit 1	Introduction to Drafting	approx. 9 weeks
Unit 2	Drafting Techniques and Skills	approx. 9 weeks
Unit 3	Descriptive Geometry	approx. 9 weeks
Unit 4	Advanced Applications and Design Special	approx. 8 weeks

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Educational Technology Standards

8.1.12.A.1, 8.1.12.B.2, 8.1.12.C.1, 8.1.12.D.1, 8.1.12.E.1, 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.

➤ **Creativity and Innovation**
- Apply previous content knowledge by creating and piloting a digital learning game or tutorial.

➤ **Communication and Collaboration**
- Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.

➤ **Digital Citizenship**
- Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.

➤ **Research and Information Literacy**
- Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.

➤ **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.

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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

- Vocabulary recognition games

- Teacher-created Unit Assessments, Chapter Assessments, Quizzes

- Teacher-created Essays, Short Answer

- Drawing and sketch accuracy tests and quizzes

- Group projects – students will brainstorm and create drawings and sketches as a group of two and present to the class, Portfolios which students can put in a binder and save for the college application process
- Homework

- Research careers in drafting and create a PowerPoint presentation

- Create sample technical drawings- graphic representation of a real life object

- Students will decide on a model they would like to draw but must use the design model step-by-step to complete the process, this can be used as a summative project. Students will create a statement; explain the requirements needed to complete the model, discussion in relation to the limitations and restrictions which could pose a problem throughout the design process, conduct research about the specifics of the model. Lastly, preliminary solutions and decision and implementation steps will be executed.

Interdisciplinary Connections

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

Social Studies
- Research the history of a given industry/profession
- Research prominent historical individuals in 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
- Research industry salaries for a geographic area and juxtapose against local cost of living
- Go on a geometry scavenger hunt
- Track and track various data, such as industry's impact on the GDP, career opportunities or among of individuals currently occupying careers

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–Architecture and Construction (AC)

Career Cluster: Architecture and Construction (AC)

- 9.3.12.AC.1 Use of vocabulary, symbols and formulas common to architecture and construction
- 9.3.12.AC.6 Read, interpret and use technical drawings, documents and specifications to plan a project

Pathway: Design/Preconstruction(AC-DES)

- Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues
- 9.3.12.AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects

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

Common Career Technical Core (CCTC)
Architecture and Construction (AC)

- AC.1 Use of vocabulary, symbols and formulas common to architecture and construction
AC.6 Read, interpret and use technical drawings, documents and specifications to plan a project

Pathway: Design/Preconstruction(AC-DES)

- AC-DES.2 Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues
- AC-DES.6 Apply the techniques and skills of modern drafting, design, engineering and construction to projects

Pathway: Maintenance/Operations (AC-MO)

- AC-MO.1 Recognize and employ universal construction signs and symbols to function safely in the workplace

Common Core State Standards (CCSS)

CCSS - English-Language Arts

Key Ideas and Details:

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.

Range of Writing:

- CCSS.ELA-LITERACY.W.11-12.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences

Common Core State Standards (CCSS)

CCSS – Mathematics

Make Geometric Constructions

- CCSS. MATH. CONTENT G.CO.12 Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.
- CCSS.MATH.CONTENT G.CO.13 Construct an equilateral triangle, a square, and a rectangular hexagon inscribed in a circle

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Course: Drafting - General **Unit:** 3 –Descriptive Geometry **Grade Level:** 9-12	**Unit Overview:** students will be able to explain the basic types of auxiliary views and explain the purpose of each type and their common applications. Students will be able to explain the projection procedures for creating auxiliary views, and draw primary and secondary auxiliary views.

New Jersey Student Learning Standards (NJSLS): 9.3.12.AC.1 9.3.12.AC.6 9.3.12.AC-DES.2 9.3.12.AC-DES.6 9.3.12.AC-MO.1

Common Career Technical Core (CCTC): AC.1 AC.6 AC-DES.2 AC-DES.6 AC-MO.1

Common Core State Standards (CCSS): W.11-12.7 W.11-12.10 G.CO.12 G.CO.13

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
Review CAD methods **NJSLS:** 9.3.12.AC.1 **CCTC:** AC-MO.1 **CCSS:** W.11-12.7	Why is the CAD method of drafting important and how will I apply it throughout the course?	Application of the CAD method to construct projects in drafting class	**CAD Computer Program** Students will be introduced to CAD computer programs in which they will practice utilizing computerized CAD methods	**CAD Tutorial-Review** https://www.youtube.com/user/AutoCADTutorials4U **CAD Methods** https://www.youtube.com/watch?v=NYo2OEIJM0s **CAD Methods** https://www.youtube.com/watch?v=hSBaRdq_ef0

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
Review manual drafting methods **NJSLS:** 9.3.12.AC.6 **CCTC:** AC-DES.6 **CCSS:** W.11-12.7 G.CO.12	Why is the manual method of drafting and constructing projects important? How will I apply this method throughout the course?	Identification of the following basic information: • True length of a line • Point view of a line • Edge view of a line • True size of a plane • True angle between planes	**Line Examples** Students will be given examples of lines and will have to identify the length, point of view, edge and angles	**Manual Drafting** https://www.youtube.com/watch?v=1zN-UtozjGc **Review of Basic Drafting** https://www.youtube.com/watch?v=smm_XlmP7WQ&list=PLisXFeL-LWjIlkrbxPoeKOnSBCCyFWsLY **Manual Drafting Basics** https://www.youtube.com/watch?v=1zN-UtozjGc
Apply techniques to basic types of auxiliary views and explain the purpose of each. **NJSLS:** 9.3.12.AC.6 **CCTC:** AC.1 **CCSS:** .W.11-12.7	How is an auxiliary view used to provide the true size and shape description of an object surface (specifically and inclined surface)?	Application of the auxiliary view to measure an object's dimensions and create and inclined plane	**Draw Inclined Surface** Draw an inclined surface, measure the shape and size of an object's surface(teacher will provide examples of shapes for students to examine)	**Basic Auxiliary Views** https://www.youtube.com/watch?v=75AlnaUreog **Auxiliary Views** https://www.youtube.com/watch?v=6MdmTydzTzk **Engineering and Drafting-Auxiliary Views**

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
				https://www.youtube.com/watch?v=77HGK7YGAYo
Identify and apply the common auxiliary views. **NJSLS:** 9.3.12.AC-DES.6 **CCTC:** AC-DES.6 **CCSS:** G.CO.12 G.CO.13	How are auxiliary common applications of auxiliary views used to create models in industry?	Creating and drawing profile auxiliary projection of models to determine if inclined surface measurements are accurate before creating actual models	**Draw Inclined Plane** Students will draw inclined planes accurately with measurements provided by the teacher, teacher check figures for accuracy	**Detailed Description of Auxiliary views and purpose of each** https://www.youtube.com/watch?v=c9bOGlsKmeU **How Applications are Used When Looking at Blueprints** https://www.youtube.com/watch?v=Uuc3bN36SA0 **Auxiliary Views-Engineer Drawings** https://www.youtube.com/watch?v=gzq48vBbODg&t=76s
Explain the projection procedures for creating auxiliary views	How will understanding projection procedures improve auxiliary views when creating models?	Ability to identify the various auxiliary views and apply projection procedures to assure	**Identifying Projection Procedures** Students will be given a copy of the projection	**Creating Auxiliary Views** https://www.youtube.com/watch?v=gzq48vBbODg

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
NJSLS: 9.3.12.AC.6 **CCTC:** AC-DES.6 **CCSS:** W.11-12.7		real-life models are possible	procedures in groups of three, they will then be asked to construct a figure with given measurements , students must identify each auxiliary view within the figure	**Auxiliary View Demonstration** https://www.youtube.com/watch?v=t_dJbhx4q98 **Explanation of Auxiliary View** https://www.youtube.com/watch?v=ynPr2NBzEaE
Draw a primary and secondary auxiliary views using manual and CAD methods **NJSLS:** 9.3.12.AC-DES.6 **CCTC:** AC-MO.1 **CCSS:** W.11-12.10 G.CO.12.W.11-12.7	Which method is most effective when creating primary and secondary auxiliary views (CAD OR Manual)?	Ability to explain in essay form the benefits, and challenges with each method as they relate to constructing figures, and models	**Comparing Drafting Methods** Students will compare and contrast the CAD and manual drafting methods in a Venn Diagram- they will discuss how the methods are similar, different, effective or ineffective when attempting to construct models, and geometric figures	**Drawing primary and secondary auxiliary views using CAD method** https://www.youtube.com/watch?v=siKUCUmWiP8 **Secondary Auxiliary Views** https://www.youtube.com/watch?v=TfvnN5xHxS0 **Primary Auxiliary View** https://www.youtube.com/watch?v=bAF4VHEdvp

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
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Unit Vocabulary
Auxiliary projections	Secondary auxiliary view
Auxiliary view	Slope
Dihedral angle	Successive auxiliary view
Primary auxiliary view	

Suggested Structured Learning Experiences

High school students will tour the architecture program at Rowan University to compare the pros and cons amongst programs in NJ. Also, students will get a better understanding of what college expect in terms of academics, portfolio creations, and extracurricular activities requirements. **Rowan University** **School of Architecture** **201 Mullica Hill Road** **Glassboro, NJ 08028**	Students will tour the prestigious Princeton University to explore the architecture and design program, and experience an accelerated, fast-paced educational environment. **Princeton University** **School of Architecture** **110 West College** **Princeton, NJ 08544**

Suggested Unit Projects
Choose At Least One

Students will illustrate primary and secondary auxiliary views manually and present the images to the class. Students will explain how the views are similar, different, and beneficial to creating models in drafting.	Students will create a colorful diagram in which they will display the importance of: • True length of a line • Point view of a line • Edge view of a line • True size of a plane • True angle between planes Students will also draw accurate accounts of inclined surfaces used in constructing models.