

Randolph Township School District  
Randolph High School

# ARCHITECTURE II

## Curriculum

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**Randolph Township Schools  
Department of STEM  
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## **Randolph Township Schools Mission Statement**

We commit to inspiring and empowering all students in Randolph Schools to reach their full potential as unique, responsible and educated members of a global society.

## **Randolph Township Schools Affirmative Action Statement**

### **Equality and Equity in Curriculum**

The Randolph Township School district ensures that the district's curriculum and instruction are aligned to the state's standards. The curriculum addresses the elimination of discrimination and the achievement gap, as identified by underperforming school-level AYP reports for state assessments. The curriculum provides equity in instruction, educational programs and provides all students the opportunity to interact positively with others regardless of race, creed, color, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, religion, disability or socioeconomic status.

N.J.A.C. 6A:7-1.7(b): Section 504, Rehabilitation Act of 1973; N.J.S.A. 10:5; Title IX, Education Amendments of 1972

**EDUCATIONAL GOALS  
RANDOLPH TOWNSHIP BOARD OF EDUCATION  
VALUES IN EDUCATION**

The statements represent the beliefs and values regarding our educational system. Education is the key to self-actualization which is realized through achievement and self-respect. We believe our entire system must not only represent these values, but also demonstrate them in all that we do as a school system.

We believe:

- The needs of the child come first.
- Mutual respect and trust are the cornerstones of a learning community.
- The learning community consists of students, educators, parents, administrators, educational support personnel, the community and Board of Education members.
- A successful learning community communicates honestly and openly in a non-threatening environment.
- Members of our learning community have different needs at different times. There is openness to the challenge of meeting those needs in professional and supportive ways.
- Assessment of professionals (i.e., educators, administrators and educational support personnel) is a dynamic process that requires review and revision based on evolving research, practices and experiences.
- Development of desired capabilities comes in stages and is achieved through hard work, reflection and ongoing growth.

**Randolph Township Schools**  
**Science, Technology, and Engineering and Math Department**  
**Introduction**

Randolph Township Schools is committed to excellence. We believe that all children are entitled to an education that will equip them to become productive citizens of the 21st century. We believe that an education grounded in the fundamental principles of science, technology, engineering, and math (STEM) will provide students with the skills and content necessary to become future leaders and lifelong learners.

A sound STEM education is grounded in the principles of inquiry, rigor, and relevance. Students will be actively engaged in learning as they use real-world STEM skills to construct knowledge. They will have ample opportunities to manipulate materials and solve problems in ways that are developmentally appropriate to their age. They will work in an environment that encourages them to take risks, think critically, build models, observe patterns, and recognize anomalies in those patterns. Students will be encouraged to ask questions, not just the “how” and the “what” of observed phenomena, but also the “why”. They will develop the ability, confidence, and motivation to succeed academically and personally.

STEM literacy requires understandings and habits of mind that enable students to make sense of how our world works. As described in Project 2061’s *Benchmarks in Science Literacy*, *The Standards for Technological Literacy*, and *Professional Standards for Teaching Mathematics*, literacy in these subject areas enables people to think critically and independently. Scientifically and technologically literate citizens deal sensibly with problems that involve mathematics, evidence, patterns, logical arguments, uncertainty, and problem-solving.

**Randolph Township Schools**  
**Department of STEM**  
**Architecture II**

**Course Introduction:**

This course is offered to any high school student interested in architecture who has completed Architecture I. The study of drafting and architecture offer insight into the process where the ever changing environment around us is developed to keep up with the evolution of technology and society. Architecture II is written for students to expand upon skills learned in previous coursework in order to create a functional and architecturally sound design that will pass all building codes. To prove that their designs are architecturally sound, students must create a scaled model of their design that includes each component of their house including wall sections, doors, windows, sill and floors, ceilings, stairs and fireplaces, a roof with a calculated pitch and a deck. Students will work with computer-aided drafting (CAD) throughout the course. Architecture II will also integrate skill building in mathematics, writing, critical thinking, and problem solving. An honors option is also offered to students, with additional requirements designated with an (H) in the unit plans.

**Randolph Township Schools  
Curriculum Pacing Chart  
Architecture II**

<b>SUGGESTED TIME ALLOTMENT</b>	<b>UNIT NUMBER</b>	<b>CONTENT - UNIT OF STUDY</b>
<b>3 Weeks</b>	<b>I</b>	<b>Sill and Floor Construction</b>
<b>3 Weeks</b>	<b>II</b>	<b>Wall and Ceiling Construction</b>
<b>2 Weeks</b>	<b>III</b>	<b>Doors and Windows</b>
<b>2 Weeks</b>	<b>IV</b>	<b>Stairs and Fireplaces</b>
<b>4 Weeks</b>	<b>V</b>	<b>Floor Plans</b>
<b>2 Weeks</b>	<b>VI</b>	<b>Roof Design</b>
<b>5 Weeks</b>	<b>VII</b>	<b>Typical Wall Sections</b>
<b>5 Weeks</b>	<b>VIII</b>	<b>Front, Rear, Right, and Left Elevations</b>
<b>3 Weeks</b>	<b>IX</b>	<b>Deck Details</b>
<b>6 Weeks</b>	<b>X</b>	<b>Plumbing and Electrical Plans</b>
<b>3 Weeks</b>	<b>XI</b>	<b>Modeling</b>

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**  
**Curriculum Template**  
**UNIT: Sill and Floor Construction**

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	
In order to have wider spans a more expensive building product must be used; the materials are stronger and tend to be friendlier to the environment because they use bi-products.	<ul style="list-style-type: none"> <li>When designing a budget for a project for a customer, what challenges might you face in choosing appropriate, sturdy materials?</li> </ul>	
Floor systems vary greatly due to materials used and different construction practices; it is the responsibility of the architect to determine whether materials or cost is the main factor.	<ul style="list-style-type: none"> <li>How might an architect sell a more expensive material to a customer on a budget?</li> </ul>	
KNOWLEDGE	SKILLS	NJCCCS
<p><b>Students will know:</b></p> <p>Platform construction is called such because the floor joists form a platform on which the wall rests.</p> <p>Balloon construction is when the wall rests directly on the sill plate and each floor hangs from the studs.</p> <p>Proper spacing and size can be determined by reading a floor joist span data chart.</p> <p>Various spans require engineered products as opposed to dimensional lumber.</p> <p>Tongue and groove plywood and oriented strand board are types of sub flooring.</p> <p>Post and beam construction uses larger planks as framing and enables larger spaces to be used.</p> <p>Engineered products can be used to create wider spans. This enables architects</p>	<p><b>Students will be able to:</b></p> <p>Compare and contrast balloon and platform framing.</p> <p>Determine the proper joist size using a typical span data chart.</p> <p>Plan the appropriate floor support using joist or trusses for a structure.</p> <p>Apply CAD principles to sill and floor construction.</p> <p>Describe the components of a floor system including floor joists, engineered floor joists, I beams and dimensional lumber.</p> <p>Explain the principles of post and beam construction.</p> <p>Select the appropriate engineered wood products for specific applications in residential construction.</p>	<p><b>Science</b>  5.1.12.B.2  5.1.12.C.1-2  5.2.12.E.2</p> <p><b>Technology</b>  8.1.12.C.1  8.1.12.D.2  8.2.12.B.1  8.2.12.F.1  8.2.12.F.3  8.2.12.G.1</p> <p><b>Math</b>  G-MG.2  G-MG.3</p> <p><b>21<sup>st</sup> Century Skills</b>  9.1.12.A.1  9.1.12.F.2  9.4.12.B.1  9.4.12.B.7  9.4.12.B.11  9.4.12.B.17-18  9.4.12.B.5</p>



<p>to make larger rooms without the use of columns.</p> <p>(H) Engineered web joists have advantages and disadvantages for floor/roof support systems.</p> <p>(H) Wood, steel, or concrete columns are used for support.</p>	<p>(H) Select the appropriate engineered long span web joists for specific residential/commercial construction.</p> <p>(H) Discuss the attributes of different types of support columns and when/where each is used</p>	<p>9.4.12.O.1</p> <p>9.4.12.O.5</p> <p>9.4.12.O.9</p> <p>9.4.12.O.15</p> <p>9.4.12.O.17</p> <p>9.4.12.O.55</p>
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**RANDOLPH TOWNSHIP SCHOOL DISTRICT**  
**Curriculum Pacing Chart**  
**Architecture II**

<b>SUGGESTED TIME ALLOTMENT</b>	<b>CONTENT-UNIT OF STUDY</b>	<b>SUPPLEMENTAL UNIT RESOURCES</b>
	<b>Sills and Floor Construction – 3 weeks</b>	
	<b>Platform and Balloon Framing</b>	
	<b>Sills, I Beams, and Joists</b>	<p><b><u>Suggested Books:</u></b>  <b>ARCHITECTURE</b>  Residential Drafting and Design  By: Lois E. Kicklighter</p> <p>IPI JOIST INTERNATIONAL PAPER  ENGINEERED WOOD PRODUCTS  Technical Data for I-Joist and Rim Board Applications for Residential  Floor and Roof Systems</p> <p>IPI JOIST INTERNATIONAL PAPER  ENGINEERED WOOD PRODUCTS  Weldwood LVL GUIDE  Technical Data for LVL Headers, Beams, Columns  &amp; Rim Board</p> <p><b><u>Suggested Software:</u></b>  Microstation  AutoDesk Suite</p> <p><b><u>Suggested Activities</u></b>  Obtain a set of house plans in small groups identify components of  Sills and Floor Framing  Make an architectural model of a simple floor joist system</p>
	<b>Dimensional Lumber</b>	
	<b>Engineered Products</b>	
	<b>Floor Joist Span Chart</b>	

# RANDOLPH TOWNSHIP SCHOOL DISTRICT

## Architecture II

### UNIT: Wall and Ceiling Construction

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	
It is the sole decision of the architect to choose methods and materials to produce a final product.	<ul style="list-style-type: none"> <li>What are the implications of engineered products over traditional products?</li> </ul>	
Technology is constantly changing to better use materials and keep up with modern building practices.	<ul style="list-style-type: none"> <li>Are all new technologies a positive attribute to construction? Explain.</li> </ul>	
KNOWLEDGE	SKILLS	NJCCCS
<p><b>Students will know:</b></p> <p>The components of the frame wall include sole plates, headers, cripplers, studs, headers, trimmer studs, and top plates.</p> <p>The process of frame wall construction includes locating wall studs on a sole plate using sixteen inch on centers, roughing out a corner, roughing out windows and doors using headers and trimmer studs, and finishing the wall using a double top plate.</p> <p>A ceiling joist span data chart for both Douglas fir and southern pine can be used to draw a detail on plans to show the size of the ceiling joists.</p> <p>There are significant differences between an exterior wall prepared for vinyl siding and an exterior wall prepared for brick, stucco, stone, or solid masonry veneers.</p> <p>Steel framing is rot, shrink, split, or warping proof. They are fire resistant and free of resin adhesives.</p> <p>(H) Standard framed walls and curtain walls are constructed in different manners.</p> <p>(H) The materials and structural support systems used in curtain wall construction are what makes it unique.</p>	<p><b>Students will be able to:</b></p> <p>Differentiate between the components of a typical frame wall.</p> <p>Explain the methods of frame wall construction in detail.</p> <p>Interpret information shown on a ceiling joist span data chart.</p> <p>Sketch the various types of exterior walls used in residential construction.</p> <p>Explain the applications, advantages, and disadvantages of steel framing in residential construction.</p> <p>(H) Describe the differences between standard framed walls and curtain walls</p> <p>(H) Justify when a curtain wall is used rather than a standard framed wall.</p> <p>(H) Discuss the types of materials and support systems used in curtain wall construction.</p>	<p><b>Science</b> 5.1.12.B.2 5.1.12.C.1-2 5.2.12.E.2</p> <p><b>Technology</b> 8.1.12.C.1 8.1.12.D.2 8.2.12.B.1 8.2.12.F.1 8.2.12.F.3 8.2.12.G.1</p> <p><b>Math</b> G-MG.2 G-MG.3</p> <p><b>21<sup>st</sup> Century Skills</b> 9.1.12.A.1 9.1.12.F.2 9.4.12.B.1 9.4.12.B.7 9.4.12.B.11 9.4.12.B.17-18 9.4.12.B.5 9.4.12.O.1 9.4.12.O.5 9.4.12.O.9 9.4.12.O.15 9.4.12.O.17</p>

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**  
**Curriculum Pacing Chart**  
**Architecture II**

<b>SUGGESTED TIME ALLOTMENT</b>	<b>CONTENT-UNIT OF STUDY</b>	<b>SUPPLEMENTAL UNIT RESOURCES</b>
	<b>Wall and Ceiling Construction – 3 weeks</b>	
	<b>Frame Wall Construction</b>	
	<b>Sole Plate</b>	<p><b><u>Suggested Books:</u></b>  <b>ARCHITECTURE</b>  Residential Drafting and Design  By: Lois E. Kicklighter</p> <p>Architectural  Drafting and Design  Fourth Edition  By: Alan Jefferies &amp; David A. Madsen</p> <p><b><u>Suggested Software:</u></b>  Microstation  AutoDesk Suite</p> <p><b><u>Suggested Activities:</u></b>  Creating a Typical Wall Section</p>
	<b>Studs, Headers and Liners</b>	
	<b>Exterior Corners and Bracing</b>	
	<b>Interior Walls</b>	
	<b>Rough Openings</b>	
	<b>Steel Framing</b>	

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**  
**Architecture II**  
**UNIT: Doors and Windows**

<b>ENDURING UNDERSTANDINGS</b>	<b>ESSENTIAL QUESTIONS</b>	
Manufacturers' change products on a continuing cycle, so it is up to the architect to stay updated on new and unique products.	<ul style="list-style-type: none"> <li>Why is architectural design essential to product redesign?</li> </ul>	
In the manufacturing world there are many shortcuts and substitutions that can save the builder money but not be the best solution for the home owner.	<ul style="list-style-type: none"> <li>How can one determine the quality of a product?</li> </ul>	
<b>KNOWLEDGE</b>	<b>SKILLS</b>	<b>NJCCCS</b>
<p><b>Students will know:</b></p> <p>Common types of interior doors such as flush, panel, bi-fold, bi-pass or sliding doors are used for interior and exterior purposes.</p> <p>Windows such as double-hung, casements, stationary, bow and bay units, and sliders have different functions in a home.</p> <p>The details of a door and window schedule are as important as accurately using information gathered from online websites and catalogues.</p> <p>Data can be created in one program for embedding into another.</p> <p>(H) CAD symbol files of windows, both in plan and elevation view, may be downloaded from major manufactures web sites for incorporation into a design.</p> <p>(H) Modern windows are available made from “smart” materials</p>	<p><b>Students will be able to:</b></p> <p>Compare and contrast the different types of doors used in interior and exterior residential construction.</p> <p>Compare and contrast the different types of windows used in interior and exterior residential construction.</p> <p>Draw door and window symbols in the correct location on a typical floor plan.</p> <p>Interpret the information shown on a window or door schedule.</p> <p>Create a data table in a word processing application that will be linked to a CAD file.</p> <p>Generate a window and door schedule that includes all pertinent window and door data such as type, rough opening, unit size, remarks, manufacturer’s call number, etc.</p> <p>(H) Data mine manufacturers’ web sites for CAD symbols and terminology.</p> <p>(H) Research different “smart” windows and determine the benefits of their use.</p>	<p><b>Science</b>  5.1.12.B.2  5.1.12.C.1-2  5.2.12.E.2</p> <p><b>Technology</b>  8.1.12.C.1  8.1.12.D.2  8.2.12.B.1  8.2.12.F.1  8.2.12.F.3  8.2.12.G.1</p> <p><b>Math</b>  G-MG.2  G-MG.3</p> <p><b>21<sup>st</sup> Century Skills</b>  9.1.12.A.1  9.1.12.F.2  9.4.12.B.1  9.4.12.B.7  9.4.12.B.11  9.4.12.B.17-18  9.4.12.B.5  9.4.12.O.1  9.4.12.O.5  9.4.12.O.9  9.4.12.O.15  9.4.12.O.17</p>

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**  
**Curriculum Pacing Chart**  
**Architecture II**

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
Doors and Windows – 2 weeks		
	Interior Doors	<p><b><u>Suggested Books:</u></b>  <b>ARCHITECTURE</b>  Residential Drafting and Design  By: Lois E. Kicklighter</p> <p>Architectural  Drafting and Design  Fourth Edition  By: Alan Jefferies &amp; David A. Madsen</p> <p>Andersen Window and Doors  Product Guide for Professionals</p> <p>Marvin Window and Doors  Product Guide  Therma Tru Doors  Entry and Patio Door Systems</p> <p><b><u>Suggested Software:</u></b>  Microstation  AutoDesk Suite</p> <p><b><u>Suggested Activities:</u></b>  Create Door and Window Schedule  Doors and Windows Research</p>
	Exterior Doors	
	Garage Doors	
	Windows	
	Energy efficiency	
	Style	

# RANDOLPH TOWNSHIP SCHOOL DISTRICT

## Architecture II

### UNIT: Stairs and Fireplaces

ENDURING UNDERSTANDINGS		ESSENTIAL QUESTIONS	
Stairs come in many shapes and are an essential part of a floor plan; it depends on the architect to design stairs so they are esthetically pleasing and functional.		<ul style="list-style-type: none"> <li>Why is it important to consider the style of stairs in a floor plan?</li> </ul>	
Location of a fireplace is more important than it is esthetically pleasing to the eye.		<ul style="list-style-type: none"> <li>How is energy efficiency altered with fireplaces?</li> </ul>	
KNOWLEDGE		SKILLS	NJCCCS
<b>Students will know:</b>		<b>Students will be able to:</b>	
Basic stairs commonly used in residential construction are straight, u-stairs, spiral, circular, winding, and L-stairs.		Describe common stair technology.	<b>Science</b> 5.1.12.B.2 5.1.12.C.1-2 5.2.12.E.2
Important terms used to describe the parts of the stairs are rise, run, stringer, baluster, newel, stringer, and nosing.		Design a stairway for a residential dwelling.	<b>Technology</b> 8.1.12.C.1 8.1.12.D.2 8.2.12.B.1 8.2.12.F.1 8.2.12.F.3 8.2.12.G.1
State and local codes have statutes to protect the home owner.		Fit a selected pair of stairs into a floor plan.	
Placement of a fireplace is crucial to good design and energy efficiency.		Explain model code requirements for handrails and guardrails.	
Fireplaces use different sources of energy to produce heat such as gas, wood, coal, and pellets.		Design an energy efficient fireplace.	<b>Math</b> G-MG.2 G-MG.3
(H) There are elevator and lift options available for handicapped use between levels.		Compare and contrast various types of fireplaces that are appropriate for a residence.	<b>21<sup>st</sup> Century Skills</b> 9.1.12.A.1 9.1.12.F.2 9.4.12.B.1 9.4.12.B.7 9.4.12.B.11 9.4.12.B.17-18 9.4.12.O.1 9.4.12.O.5 9.4.12.O.9 9.4.12.O.15 9.4.12.O.17 9.4.12.O.55
(H) Modern fireplace design incorporates exterior air into the firebox and catalytic converters in the flue.		(H) Analyze available handicapped options and determine whether a lift or an elevator would be best for an original design.	
		(H) Design air intake systems for a fireplace.	

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**  
**Curriculum Pacing Chart**  
**Architecture II**

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
Stairs and Fireplaces – 2 weeks		
	Types of Stairs and Terminology	<p><b><u>Suggested Books:</u></b>            ARCHITECTURE            Residential Drafting and Design            By: Lois E. Kicklighter</p> <p>Architectural            Drafting and Design            Fourth Edition            By: Alan Jefferies &amp; David A. Madsen</p> <p><b><u>Suggested Software:</u></b>            Microstation            AutoDesk</p> <p><b><u>Suggested Activities:</u></b>            Design and Place Stairs on Floor Plans            Design and Place Fireplaces on Floor Plans</p>
	Calculations and Structural Details	
	Local and State Code Requirements for Handrails	
	Fireplace Design and Safety	



**RANDOLPH TOWNSHIP SCHOOL DISTRICT**  
**Architecture II**  
**UNIT: Floor Plans**

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	
Floor plans identify the location of all fixed features of the house.	<ul style="list-style-type: none"> <li>How does one make a subjective analysis of a set of floor plans?</li> </ul>	
Architects both famous and infamous can produce houses that people call homes.	<ul style="list-style-type: none"> <li>What makes an architect's design successful?</li> </ul>	
KNOWLEDGE	SKILLS	NJCCCS
<p><b>Students will know:</b></p> <p>Typical floor plans include dimension of exterior and interior walls, windows, doors, major appliances, cabinets, fixtures, fireplaces, etc.</p> <p>CAD programming can be used to efficiently fill pattern areas.</p> <p>Patterns such as fireplaces use repetitious lines and fills.</p> <p>An understanding of local code is essential for creating a working floor plan.</p> <p>Room sizing tools and pre-developed symbols can be used to draw first and second floor plans.</p> <p>Dimensioning is an essential component of a design.</p> <p>Room flow is an important criterion for determining the success or failure of a house.</p> <p>(H) Floor-framing plans are created with special attention to joists and support cross members.</p>	<p><b>Students will be able to:</b></p> <p>Interpret the information required on a typical floor plan.</p> <p>Represent typical materials using standard architectural fills symbol patterns.</p> <p>Design a residential floor plan using accepted techniques.</p> <p>Accurately use room sizing tools to draw a residential floor plan.</p> <p>Dimension a floor plan in a clear and precise manner.</p> <p>Differentiate between a well drawn and a poorly drawn floor plan.</p> <p>Draw a floor plan by hand and with CAD.</p> <p>(H) Create a floor-framing plan showing all joists, their directions, and any supporting framing members necessary for special areas.</p>	<p><b>Science</b>  5.1.12.B.2  5.1.12.C.1-2  5.2.12.E.2</p> <p><b>Technology</b>  8.1.12.C.1  8.1.12.D.2  8.2.12.B.1  8.2.12.F.1  8.2.12.F.3  8.2.12.G.1</p> <p><b>Math</b>  G-MG.2  G-MG.3</p> <p><b>21<sup>st</sup> Century Skills</b>  9.1.12.A.1  9.1.12.F.2  9.4.12.B.1  9.4.12.B.7  9.4.12.B.11  9.4.12.B.17-18  9.4.12.B.5  9.4.12.O.1  9.4.12.O.5  9.4.12.O.9  9.4.12.O.15  9.4.12.O.17  9.4.12.O.55</p>

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**  
**Curriculum Pacing Chart**  
**Architecture II**

<b>SUGGESTED TIME ALLOTMENT</b>	<b>CONTENT-UNIT OF STUDY</b>	<b>SUPPLEMENTAL UNIT RESOURCES</b>
<b>The Floor Plan – 4 weeks</b>		
	<b>Exterior Wall</b>	<p><b><u>Suggested Books:</u></b>  <b>ARCHITECTURE</b>  Residential Drafting and Design  By: Lois E. Kicklighter</p> <p>Architectural  Drafting and Design  Fourth Edition  By: Alan Jefferies &amp; David A. Madsen</p> <p><b><u>Suggested Software:</u></b>  Microstation  AutoDesk Suite</p> <p><b><u>Suggested Activities:</u></b>  Creating a Floor Plan  Hand Drawing Floor Plans  CAD drafting</p>
	<b>Interior Walls</b>	
	<b>Door and Window Openings</b>	
	<b>Room Labeling</b>	
	<b>Material Symbols</b>	
	<b>Dimensioning</b>	
	<b>Manual Drafting of a Floor Detail</b>	

# RANDOLPH TOWNSHIP SCHOOL DISTRICT

## Architecture II

### UNIT: Roof Design

ENDURING UNDERSTANDINGS		ESSENTIAL QUESTIONS	
Computer drafting programs provide a detailed understanding of roof lines.		<ul style="list-style-type: none"> <li>How can one determine if a roof is successful?</li> </ul>	
KNOWLEDGE		SKILLS	NJCCCS
<b>Students will know:</b>  Architectural tools provide for the drawing of an angle that will match the pitch of the roof.  A rafter span chart details information on span and rafter size.  All houses must be vented or there will excessive amounts of rot or mold. Air flow must be generated and the attic will allow the movement of air that is needed.  A valley is where two roof lines meet whereas the location where two rafters meet will be the ridge/peak of the roof.  (H) “Green” alternative energy technology can be incorporated through the use solar panels and solar shingles		<b>Students will be able to:</b>  Draw a roof that has a designated pitch.  Analyze and interpret information found on a rafter span chart.  Explain the importance of proper attic ventilation as if speaking to a customer.  Design a well vented roof using CAD applications.  Compare and contrast a valley and a peak in formal, technical writing.  (H) Research, evaluate, and incorporate “Green” alternative energy technologies in a roof design.	<b>Science</b> 5.1.12.B.2 5.1.12.C.1-2 5.2.12.E.2  <b>Technology</b> 8.1.12.C.1 8.1.12.D.2 8.2.12.B.1 8.2.12.F.1 8.2.12.F.3 8.2.12.G.1  <b>Math</b> G-MG.2 G-MG.3  <b>21<sup>st</sup> Century Skills</b> 9.1.12.A.1 9.1.12.F.2 9.4.12.B.1 9.4.12.B.7 9.4.12.B.11 9.4.12.B.17-18 9.4.12.B.5 9.4.12.O.1 9.4.12.O.5 9.4.12.O.9 9.4.12.O.15 9.4.12.O.17 9.4.12.O.55

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**  
**Curriculum Pacing Chart**  
**Architecture II**

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
Roof Design –2 weeks		
	Roof Features, Styles, and Details	<p><b><u>Suggested Books:</u></b>  ARCHITECTURE  Residential Drafting and Design  By: Lois E. Kicklighter</p> <p>Architectural  Drafting and Design  Fourth Edition  By: Alan Jefferies &amp; David A. Madsen</p> <p><b><u>Suggested Software:</u></b>  Microstation  AutoDesk Suite</p> <p><b><u>Suggested Activities:</u></b>  Create a Roof Plan  Calculating Pitch</p>
	Ventilation	
	Pitch and Slope Calculations	
	Fascia Boards	

# RANDOLPH TOWNSHIP SCHOOL DISTRICT

## Architecture II

### UNIT: Typical Wall Section

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	
There are numerous amounts of building materials that make up a house and with the aid of a typical wall section, all materials can be identified.	<ul style="list-style-type: none"> <li>What is the value of a cosmetic exterior to a consumer?</li> </ul>	
Using the information from the typical wall section one can understand the amount of work and materials go into the building of a house.	<ul style="list-style-type: none"> <li>What are essential factors to consider when purchasing a home?</li> </ul>	
KNOWLEDGE	SKILLS	NJCCCS
<p><b>Students will know:</b></p> <p>When the exterior coverings are removed, a corner dissection shows all the structural components.</p> <p>A detailed section showing all of the materials used to construct houses is important for proper planning.</p> <p>Material such as studs, headers, sole plates and sheet-rock must be drawn to scale and placed in a wall section.</p> <p>Components of a wall section can be identified by color, symbols, or lines.</p> <p>Structural supports are identified by the drawing marks for engineered lumber or steel.</p> <p>(H) Some structure incorporate non-load bearing curtain walls.</p>	<p><b>Students will be able to:</b></p> <p>Explain the four divisions of the typical wall sections, Foundation, First Floor, Second Floor, and the Roof.</p> <p>Analyze the cross section of each division in a detailed drawing to show the components of that section.</p> <p>Create a scaled drawing by hand and with CAD.</p> <p>Detail the structural components of a house in a drawing.</p> <p>Draw detailed sections which include sill plates, lally columns and bases &amp; caps, soffit area, footers, and foundation floor.</p> <p>(H) Determine the suitability of curtain walls in a structure.</p>	<p><b>Science</b>            5.1.12.B.2            5.1.12.C.1-2            5.2.12.E.2</p> <p><b>Technology</b>            8.1.12.C.1            8.1.12.D.2            8.2.12.B.1            8.2.12.F.1            8.2.12.F.3            8.2.12.G.1</p> <p><b>Math</b>            G-MG.2            G-MG.3</p> <p><b>21<sup>st</sup> Century Skills</b>            9.1.12.A.1            9.1.12.F.2            9.4.12.B.1            9.4.12.B.7            9.4.12.B.11            9.4.12.B.17-18            9.4.12.B.5            9.4.12.O.1            9.4.12.O.5            9.4.12.O.9            9.4.12.O.15            9.4.12.O.17</p>

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**  
**Curriculum Pacing Chart**  
**Architecture II**

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
	<b>Typical Wall Sections – 5 weeks</b>	
	<b>Corner Section</b>	<p><b><u>Suggested Books:</u></b>  ARCHITECTURE  Residential Drafting and Design  By: Lois E. Kicklighter</p> <p>Architectural  Drafting and Design  Fourth Edition  By: Alan Jefferies &amp; David A. Madsen</p> <p><b><u>Suggested Software:</u></b>  Microstation  Autodesk</p> <p><b><u>Suggested Activities:</u></b>  Creating a Wall Section  Continue Developing Wall Sections</p>
	<b>Room Heights</b>	
	<b>Material Considerations</b>	
	<b>Foundation Height</b>	
	<b>Wall Construction</b>	

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**  
**Architecture II**  
**UNIT: Front, Rear, Right, and Left Elevations**

<b>ENDURING UNDERSTANDINGS</b>		<b>ESSENTIAL QUESTIONS</b>	
Elevation views are one of the key factors when customers are communicating with an architect.		<ul style="list-style-type: none"> <li>If elevation views weren't available to the customer how would he/she understand the total look of the finished house?</li> </ul>	
Elevations are visuals designed for ease of understanding.		<ul style="list-style-type: none"> <li>If the architect and customer sat down together, how could they communicate effectively to generate a product?</li> </ul>	
<b>KNOWLEDGE</b>		<b>SKILLS</b>	<b>NJCCCS</b>
<b>Students will know:</b>		<b>Students will be able to:</b>	
An elevation is an orthographic projection drawing that shows one side of the building.		Identify features that should be included on an exterior elevation.	<b>Science</b> 5.1.12.B.2 5.1.12.C.1-2 5.2.12.E.2
Elevation views include siding, windows, doors, decorative moldings, roof lines, exposed foundations, and chimney.		Explain the purpose and types of elevation drawings.	<b>Technology</b> 8.1.12.C.1 8.1.12.D.2 8.2.12.B.1 8.2.12.F.1 8.2.12.F.3 8.2.12.G.1
Each elevation will give the prospective customer an insight at what the house will look like from each of the four views.		Analyze an elevation drawing to describe the intended outcome.	
Both the width and height of house will be included on elevation drawings.		Locate symbols often found on elevation drawings.	
Symbols such as shingle type, siding, shutters and flashing are identified by text and arrows.		Justify the application of symbols on an elevation drawing.	<b>Math</b> G-MG.2 G-MG.3
Standard elevation views are created by the use of floor plans and the typical wall section.		Create a set of elevation views through CAD applications.	<b>21<sup>st</sup> Century Skills</b> 9.1.12.A.1 9.1.12.F.2 9.4.12.B.1 9.4.12.B.7 9.4.12.B.11 9.4.12.B.17-18 9.4.12.B.5 9.4.12.O.1 9.4.12.O.5 9.4.12.O.9 9.4.12.O.15 9.4.12.O.17
(H) Different materials and structural components are identified using specific symbols and techniques.		(H) Diagram all appropriate symbols and height designations on each view.	

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**  
**Curriculum Pacing Chart**  
**Architecture II**

<b>SUGGESTED TIME ALLOTMENT</b>	<b>CONTENT-UNIT OF STUDY</b>	<b>SUPPLEMENTAL UNIT RESOURCES</b>
<b>Elevations –5 weeks</b>		
	<b>Procedure for Drawing and Elevation on CAD</b>	
	<b>Front View</b>	<p><b><u>Suggested Books:</u></b>  <b>ARCHITECTURE</b>  Residential Drafting and Design  By: Lois E. Kicklighter</p> <p>Architectural  Drafting and Design  Fourth Edition  By: Alan Jefferies &amp; David A. Madsen</p> <p><b><u>Suggested Software:</u></b>  Microstation  AutoDesk Suite</p> <p><b><u>Suggested Activities:</u></b>  Creating Multiple Elevation Views</p>
	<b>Rear View</b>	
	<b>Left View</b>	
	<b>Right View</b>	



**RANDOLPH TOWNSHIP SCHOOL DISTRICT**  
**Architecture II**  
**UNIT: Deck Details**

<b>ENDURING UNDERSTANDINGS</b>		<b>ESSENTIAL QUESTIONS</b>	
Decks are an exterior structure built with materials that can withstand the weather.		<ul style="list-style-type: none"> <li>Why do so many details have to be included on a standard set of plans?</li> </ul>	
The need for detailed drawings is important to the customer, contractor, and the local inspector.		<ul style="list-style-type: none"> <li>What are the ramifications if a homeowner does not know each detail of a deck plan?</li> </ul>	
<b>KNOWLEDGE</b>		<b>SKILLS</b>	<b>NJCCCS</b>
<b>Students will know:</b>		<b>Students will be able to:</b>	
Deck joist, beams, posts, railings, seats, and ledger board are essential components of a sturdy deck.		Apply CAD to create an original design of a forty square foot deck.	<b>Science</b> 5.1.12.B.2 5.1.12.C.1-2 5.2.12.E.2
The functional parts of a railing are the top rail, bottom rail, balusters, newels, and finials.		Draw a set of floor plans for an original deck.	<b>Technology</b> 8.1.12.C.1 8.1.12.D.2 8.2.12.B.1 8.2.12.F.1
The fundamental components of a set of stairs include risers, bull nose tread, stringers, and rail parts associated with the stairs.		Create an elevation drawing showing railings and stairs along with structural supports.	8.2.12.F.3
The footer detail must be included in a deck drawing to meet local and state codes.		Generate a set of detailed drawings including all stair and railing components.	8.2.12.G.1
A plotter is the proper tool to print all necessary drawings.		Construct a footer detail complying with local and state code requirements.	<b>Math</b> G-MG.2 G-MG.3
(H) Some manufacturers, such as Lowes, have Internet accessible simple deck design sites.		Print a "C" set of working plans using 24" format printer.	<b>21<sup>st</sup> Century Skills</b> 9.1.12.A.1 9.1.12.F.2 9.4.12.B.1 9.4.12.B.7 9.4.12.B.11 9.4.12.B.17-18 9.4.12.B.5 9.4.12.O.1 9.4.12.O.5 9.4.12.O.9 9.4.12.O.15
		(H) Navigate the Lowes Deck Designer site to input an original deck in order to create a 3 Deck Design and a materials take-off.	

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**  
**Curriculum Pacing Chart**  
**Architecture II**

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
<b>Deck Detail – 3 weeks</b>		
	<b>Deck Materials</b>	<p><b><u>Suggested Books:</u></b>  ARCHITECTURE  Residential Drafting and Design  By: Lois E. Kicklighter</p> <p>Architectural  Drafting and Design  Fourth Edition  By: Alan Jefferies &amp; David A. Madsen</p> <p><b><u>Suggested Software:</u></b>  Microstation  AutoDesk Suite</p> <p><b><u>Suggested Activities:</u></b>  Design A Deck  Model a Deck</p>
	<b>Deck Structure</b>	
	<b>Detailed Deck Components</b>	

**RANDOLPH TOWNSHIP SCHOOLS**  
**Curriculum Template**  
**UNIT: Plumbing and Electrical Plans**

<b>ENDURING UNDERSTANDINGS</b>		<b>ESSENTIAL QUESTIONS</b>	
Plumbing systems supply the house with fresh hot and cold water, and removes waste through sanitary sewer or private septic systems.		<ul style="list-style-type: none"> <li>What would it be like if we didn't have modern plumbing in our houses?</li> </ul>	
Planning for the electrical needs of a home requires a basic understanding of electrical requirements for lighting and appliances, code restrictions, and safety considerations.		<ul style="list-style-type: none"> <li>What would your great grandfather think if he entered into your house and saw the modern suffocated electrical wiring?</li> </ul>	
<b>KNOWLEDGE</b>		<b>SKILLS</b>	<b>NJCCCS</b>
<b>Students will know:</b>  Plumbing systems supplies water throughout the house and removes wastewater through drainage systems.  There are many different components contained in a water system such as heaters, cold water mains, sinks, faucets, and toilets.  Drainage systems have many unseen components such as air vent stacks, soil stacks, cleanouts, sump discharge, and traps.  There are two basic in-house water treatment systems. Septic tanks are used to separate solids from liquids and are constructed on the homeowner's property. City sewer is a system that takes the waste from the house to a main in the street and is pumped to a treatment facility controlled by a town.  Several terms associated with the electrical system of the house are used to communicate with others. These include ampere, circuit, circuit breaker, conductor, fuse, outlet, lighting fixture, ohm, receptacle, service panel, and voltage.  Electrical needs start with the service panel, also known as the distribution panel, which supplies the electricity to a house. Placement of this panel is important because wires run from the panel throughout the house.  Lighting circuits, special appliance circuits, and individual appliance circuits are the three types of circuits that supplies electric to outlets throughout the house.		<b>Students will be able to:</b>  Discuss the purpose of a residential plumbing system.  Design a functional residential water system.  Formulate a functional residential water and waste removal system.  Explain the operations of various in-house water treatment systems.  Apply correct terminology to describe a functional electrical system in a house.  Plan for electrical needs of a modern home.  Identify and explain the three types of electrical circuits used in a residential structure.	<b>Science</b> 5.1.12.B.2 5.1.12.C.1-2 5.2.12.E.2  <b>Technology</b> 8.1.12.C.1 8.1.12.D.2 8.2.12.B.1 8.2.12.F.1 8.2.12.F.3 8.2.12.G.1  <b>Math</b> G-MG.2 G-MG.3  <b>21<sup>st</sup> Century Skills</b> 9.1.12.A.1 9.1.12.F.2 9.4.12.B.1 9.4.12.B.7 9.4.12.B.11 9.4.12.B.17-18 9.4.12.B.5 9.4.12.O.1 9.4.12.O.5

<p>In order to calculate how large of an amp service is needed for a house, one must take into consideration size of residence, number of lighting circuits, special appliance circuits, and individual appliance circuits and calculate enough amps to run the house.</p> <p>Low voltage lighting is easy for homeowners to install, but the amount of light that it provides is also low.</p> <p>(H) Electrical lines/runs are designated according to standards. They are drawn in arcs rather than straight lines.</p> <p>(H) Plumbing plans are create in a “tree” format that delineates fixtures, feed runs, and slope of returns</p>	<p>Calculate circuit requirements for a residence.</p> <p>Explain the advantages and disadvantages of low voltage exterior lighting.</p> <p>(H) Create a simple, yet functional, electrical plan for a home.</p> <p>(H) Create a typical plumbing “tree” plan using elevation plans.</p>	<p>9.4.12.O.9 9.4.12.O.15 9.4.12.O.17 9.4.12.O.55</p>
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**RANDOLPH TOWNSHIP SCHOOL DISTRICT**  
**Curriculum Pacing Chart**  
**Architecture II**

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
	<b>Plumbing and Electrical Plans – 6 weeks</b>	
	<b>Water supplies</b>	
	<b>Conditioners, softeners, and heaters</b>	<p><b><u>Suggested Books:</u></b>  <b>ARCHITECTURE</b>  Residential Drafting and Design  By: Lois E. Kicklighter</p> <p>Architectural  Drafting and Design  Fourth Edition  By: Alan Jefferies &amp; David A. Madsen</p> <p><b><u>Suggested Software:</u></b>  Microstation  AutoDesk Suite</p> <p><b><u>Suggested Activities:</u></b>  Creating a Plumbing Plan  Reviewing Plumbing Fixtures  Creating a Plumbing Tree  Calculating Voltage  Creating Electrical Plans  Adhering to Codes</p>
	<b>Supply Runs</b>	
	<b>Waste returns</b>	
	<b>Electrical Terms and Circuits</b>	
	<b>Voltage</b>	
	<b>Interior and Exterior Lighting</b>	

**RANDOLPH TOWNSHIP SCHOOLS**  
**Architecture II**  
**UNIT: Modeling**

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS	
A model allows the customer to visualize the product of a design.	<ul style="list-style-type: none"> <li>How are models valuable to architects in different stages of construction?</li> </ul>	
KNOWLEDGE	SKILLS	NJCCCS
<p><b>Students will know:</b></p> <p>Objects must be plotted to scale in order to accurately build a model.</p> <p>Hot glue is the medium that allows paper to be mounted to foam core.</p> <p>Proper model assembly requires the placing of exterior walls prior to constructing the interior walls.</p> <p>Plans can be read to locate all doors and windows.</p> <p>There are different styles of roofs which are appropriate for varying circumstances.</p> <p>(H) Balsawood or basswood can be manipulated to create a “stick” model of a building’s framing components.</p>	<p><b>Students will be able to:</b></p> <p>Plot first and second floor layouts to half inch equal one foot.</p> <p>Mount plots to foam core to aid in the visualization of an original design.</p> <p>Create exterior and interior walls to scale.</p> <p>Cut foam core to scaled heights and lengths.</p> <p>Construct all window and door openings accurately and to scale.</p> <p>Select a roof style appropriate for the original design.</p> <p>Measure, cut, and mount the roof using a variety of tools.</p> <p>(H) Create a “stick” model using balsawood or basswood to demonstrate framing.</p>	<p><b>Science</b>  5.1.12.B.2  5.1.12.C.1-2  5.2.12.E.2</p> <p><b>Technology</b>  8.1.12.C.1  8.1.12.D.2  8.2.12.B.1  8.2.12.F.1  8.2.12.F.3  8.2.12.G.1</p> <p><b>Math</b>  G-MG.2  G-MG.3</p> <p><b>21<sup>st</sup> Century Skills</b>  9.1.12.A.1  9.1.12.F.2  9.4.12.B.1  9.4.12.B.7  9.4.12.B.11  9.4.12.B.17-18  9.4.12.B.5  9.4.12.O.1  9.4.12.O.5  9.4.12.O.9  9.4.12.O.15  9.4.12.O.17  9.4.12.O.55</p>

**RANDOLPH TOWNSHIP SCHOOL DISTRICT**  
**Curriculum Pacing Chart**  
**Architecture II**

<b>SUGGESTED TIME ALLOTMENT</b>	<b>CONTENT-UNIT OF STUDY</b>	<b>SUPPLEMENTAL UNIT RESOURCES</b>
<b>Modeling - 3 weeks</b>		
	<b>Safety Demonstration</b>	
	<b>Foam Core Use</b>	<p><b><u>Suggested Books:</u></b>  <b>ARCHITECTURE</b>  Residential Drafting and Design  By: Lois E. Kicklighter  Architectural  Drafting and Design  Fourth Edition  By: Alan Jefferies &amp; David A. Madsen</p> <p><b><u>Suggested Software:</u></b>  Microstation  Autodesk</p> <p><b><u>Suggested Activities:</u></b>  Create Foam Core Models of House Design  Stick Models of House Design</p>
	<b>Plotting of Floor Plan</b>	
	<b>Model Construction</b>	

**RANDOLPH TOWNSHIP SCHOOL DISTRICT  
APPENDIX ORDER**

**APPENDIX A  
RESOURCES:**

**TEXT AND ELECTRONIC TEXT**

**ARCHITECTURE**

Residential Drafting and Design

By: Lois E. Kicklighter

Architectural Drafting and Design

Fourth Edition

By: Alan Jefferies & David A. Madsen

**WEB ADDRESSES:**

[www.kohler.com](http://www.kohler.com)

[www.andersen.com](http://www.andersen.com)

[www.marvinwindow.com](http://www.marvinwindow.com)

[www.coolhouseplans.com](http://www.coolhouseplans.com)

[www.builderonline.com](http://www.builderonline.com)

[www.homesofelegance.com](http://www.homesofelegance.com)

[www.concretehomes.com](http://www.concretehomes.com)

[www.owenscorning.com](http://www.owenscorning.com)

[www.masonite.com](http://www.masonite.com)

[www.renoldsbp.com](http://www.renoldsbp.com)

[http://www.lowes.com/cd\\_Deck+Designer+Planner\\_733683095 ?UserSearch=deck+designer&rpp=16](http://www.lowes.com/cd_Deck+Designer+Planner_733683095?UserSearch=deck+designer&rpp=16)

**SOFTWARE NAMES:**

Microstation V8 XM Edition

3D Home Architect

AutoDesk Suites

Microsoft Office



## **APPENDIX B**

### **ASSESSMENT:**

#### **LIST OF ASSEMENT/TYPE**

Portfolio Assessment  
Drawing Quality and Accuracy  
Design Challenges  
Class Participation  
Class Discussions  
Sketches  
Projects  
Modeling Project  
Papers

#### **SUGGESTED RUBRICS TBD**

## **APPENDIX C**

### **SAMPLE INTERDISCIPLINARY UNITS**

Topics of study will provide an overview of the clear connection between each content area in STEM education. Drafting and architecture are used by scientists and engineers for a variety of purposes. Geometry is an essential component of both mechanical drawing and CAD thereby providing a mathematics connection. Current technology and careers will be explored throughout the course as well as an application of the engineering design process to solve problems.

## **APPENDIX D**

### **PLACEMENT CRITERIA**

Any high school student who has completed Architecture I may enroll in the course.