Washington Township Public Schools
COURSE OF STUDY – CURRICULUM GUIDE

Course: **Architecture Design Systems**

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Description: Architecture Design Systems

Architecture Design Systems is a full year course where students are instructed in advanced design techniques, residential, commercial, and landscape architecture. Use of the design and problem solving loop is re-enforced. Students will learn how to communicate design ideas using sketches, orthographic projections, renderings, mockups and presentation models. Students are also introduced to building information modeling. Students will use Revit software to create solutions to a variety of problems including topographic and site design, alternate energy design and non-traditional building material selection and application. Instruction is also given in the development of math skills needed for design and model construction. Students are given design problems which require the application of critical thinking skills. As students progress through the year they may be given an opportunity to propose and work on a design problem they have an interest in solving. They will also be given the opportunity to compete in the Technology Student Association Competition.

Jack McGee: *Interim Assistant Superintendent for Curriculum & Instruction*
Gretchen Gerber: *Director of Elementary Education*
Cleve Bryan: *Interim Director of Secondary Education*

Written: August, 2015
Revised:
BOE Approval: SEPTEMBER, 2015

DEMONSTRABLE PROFICIENCIES

COURSE TITLE: **933 Architecture Design Systems**

1. CLASSWORK REQUIREMENTS

A. Obtain the signature of a parent or guardian and sign the Washington Township Board of Education Program R2361 Technology/ Internet Acceptable Use Agreement.
B. Follow all rules and regulations of the classroom and lab facilities.
C. Be responsible in maintaining equipment that the students are being trained with.
D. Be prepared for class with an engineering journal, lab book and writing equipment necessary for the assignments and work that may be given daily.
E. Demonstrate an understanding of basic skills in reading, writing, and mathematics.
F. Know and apply appropriate safety rules and regulations and demonstrate the safe operation of equipment.
G. Become familiar with computer software, architectural terms, and systems

2. ATTITUDE & BEHAVIOR

A. Demonstrate respect for all persons present in the classroom
B. Abide by the R2361 Technology / Internet Acceptable Use Agreement.
C. CONFORM TO ALL BOARD OF Ed policies
D. Assume responsibility for making arrangements with the teacher to make up any work missed due to absence.
E. Participate in class discussions and respect others' opinions.
F. Complete assignments in a timely manner.
G. Complete On-line reading assignments and prepare for upcoming activities and assignments.
H. Bring required materials to class on a daily basis.
I. Abide by and follow Internet Copyright laws.

3. COURSE OBJECTIVES/OVERVIEW

A. COURSE CONTENT

- Classroom equipment and orientation
- Personal and equipment safety
- What is Architecture
- Career opportunities
- Evolution and History
- People and their structures
- Basic House Design
- Sketching
- Parametric CADD for Architecture
- The house you live in
- Floor Plans
- Elevations
- Electrical Systems
- Plumbing Systems
- HVAC Systems
- Alternate energy design
- Architectural Models

B. SKILLS

Upon completion of this course, students will be able to perform tasks related to the following:

- Discuss the advantages and disadvantages of the different careers surrounding architecture.
- Identify the varying educational requirements and programs required to become an architect
- Identify different styles and types of structures.
- Design a structure based on a set of client wants and needs.
- Design a residence that can function off the grid
- Identify and work with common and alternative building materials in their designs.
- Allow for local weather and environmental conditions that affect their design.
- Work within local and national building codes.

C. APPRECIATION OF CONCEPTS

4. ATTENDANCE

Attendance: Refer to Board of Education Policy

V. GRADING PROCEDURES

A. Grades are determined from classroom exercises 10%, homework 10%, presentations 10%, note books 10 %, quizzes 10%, lab work 40%, and Tests 10%

Semester 1 Grade (S1) is calculated:
(50% of Y1)
MP1=20%, MP2=20%, “Mid-term”
(X1) exam = 10%

Semester 2 Grade (S2) is calculated:
(50% of Y1)
MP3= 20%, MP4=20%, Final (X2)
Exam=10%

Final Grade (Y1) is calculated:
S! + S2 = Y1

MAJOR UNITS OF STUDY

Course Title: 933 Architecture Design Systems

I. Introduction to Course, Lab and Safety

II. Architectural Design Fundamentals

III. Room and Space Planning

IV. Plot Plans and Foundations

V. Formulating a Design

VI. Construction Systems

VII. Electrical, Plumbing, and Mechanical Systems

VIII. Designing for Alternative Energy Application

UNIT OVERVIEW

Course Title: **Architectural Design Systems**

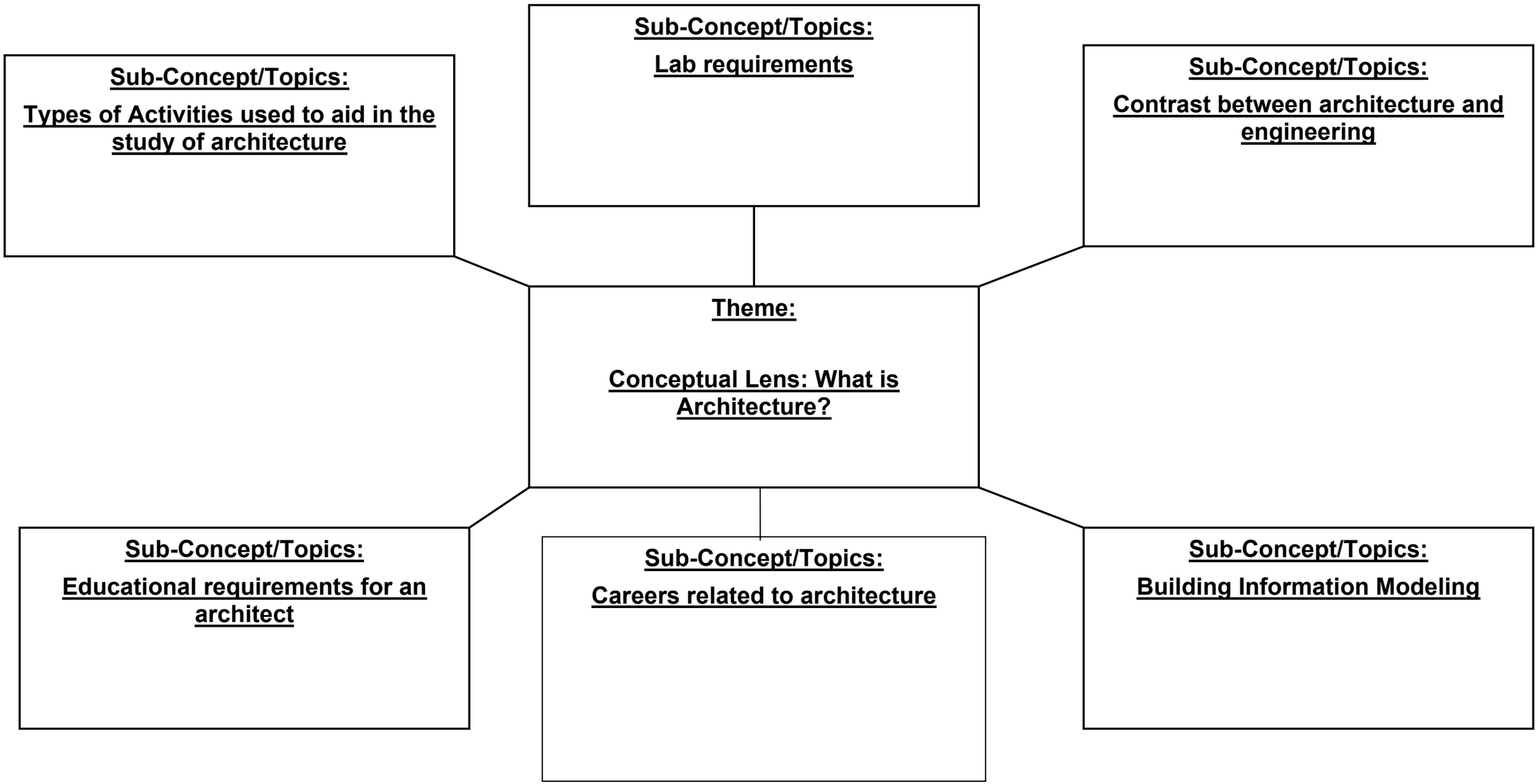
Unit #: **UNIT 1** **Unit Title:** **Introduction to Architecture, Course, Lab and Safety**

Unit Description and Objectives:
This unit's purpose is to introduce students to the course, lab and safety requirements that are necessary for participation in the class.

Essential Questions and Enduring Understandings:

Essential Questions:	**Enduring Understandings/Generalizations Students will understand that:**	**Guiding Questions**
1. What is architecture? 2. What types of activities do we do in the class? 3. What educational requirements does an architect need to become licensed? 4. Can you work as an architect without being licensed? 5. Why is safety important in the lab?	1. Architecture is the systematic study of the built environment. 2. There are a variety of activities that we use from computer design to model building to convey architectural concepts. 3. Architects can be licensed professionals or they can work under a licensed architect. 4. Many architecture programs require five years of study. 5. It is important to conduct ourselves in a safe and prudent manner during all phases of the course.	1 What is the difference between what an architect does and what a structural engineer does? 2. Do you have to have a license to practice architecture? 3. Does an architect have the ability to design structural systems? 4. Why should architects be concerned with means of egress?

UNIT GRAPHIC ORGANIZER



CURRICULUM UNIT PLAN

Course Title/Grade: Architectural Design Systems

Unit Number/Title: I Introduction to Course, Lab and Safety

Conceptual Lens: What is Architecture?

Appropriate Time Allocation (# of Days): 5

Primary Content Standards referenced With Cumulative Progress Indicators			
8.2.12.B.4	9.3.12.AC.5		
8.2.12.C.5	9.3.12.AC.7		
9.3.12.AC.4			

Topics/Concepts (Incl. time / # days per topic)	Critical Content (Students Will Know :)	Skill Objectives (Students Will Be Able To :)	Instructional/Learning Activities & Interdisciplinary Connections	Instructional Resources	Technology & 21st C Skills Integration (Specify)	NJSLS w/ CPI Reference	Evaluation/ Assessment:
1. What is Architecture? 2. Introduction to the Facilities 3. Course Activities and requirements 4. Careers 5. Building Information Modeling 6. Safety in the lab a. Use of modeling tools i. Utility knife ii. X-acto knife iii. Foam core cutter iv. Safety edges v. Cutting mats b. Use of power tools i. Band saw j. Scroll saw k. Sanders l. Miter saw	1. Architecture is the systematic study of the built environment 2. Egress procedures and basic lab safety 3. Careers related to Architecture 4. What BIM stands for and how it differs from CAD 5. What is the difference between architecture and engineering 6. How to safely use all tools associated with the fabrication of models.	1. Define Architecture 2. Locate their evacuation quadrant for any given emergency or drill 3. List the different types of activities used to deliver the curriculum 4.Log in and open the Revit software 5. Define the difference between architecture and engineering. 6. Demonstrate safe and	1. Look up definitions and compare and contrast to other students' definitions 2. Select an architectural style and trace it's evolution 3. Use the Occupational Outlook Handbook to find careers related to architecture 4. Open the Revit software to become acquainted with the GUI 5. Students build a model of the classroom out of oak tag	1. Functioning network and internet connection 2. Revit Software 3. Oak tag 4. Scissors 5. Roto-trim 6. Tape 7. Architect's scale	P21 Framework 1. Communication And Collaboration 2. Information Literacy	8.2.12.B.4 8.2.12.C.5 9.3.12.AC.4 9.3.12.AC.5 9.3.12.AC.7	Formative Assessments: 1. Teacher questions students regarding egress directions and how they differ from emergency to emergency or drill. 2. Teacher directs student discussion regarding differences in architecture and engineering. 3. Students

Topics/Concepts (Incl. time / # days per topic)	Critical Content (Students Will Know :)	Skill Objectives (Students Will Be Able To :)	Instructional/Learning Activities & Interdisciplinary Connections	Instructional Resources	Technology & 21st C Skills Integration (Specify)	NJSLS w/ CPI Reference	Evaluation/ Assessment:
.		effective use of all tools associated with the fabrication of necessary models.					look up architecture-related careers on the OOH and turn in a written report on findings 4. Students orally describe the concept of BIM 5. Teacher observes students during lay out and construction of lab model. Summative Assessment(s) 1. Students show up at assigned egress locations according to drill/emergency 2. Students list educational requirements, salary, work

Topics/Concepts (Incl. time / # days per topic)	**Critical Content** (Students Will Know :)	**Skill Objectives** (Students Will Be Able To :)	**Instructional/Learning Activities & Interdisciplinary Connections**	**Instructional Resources**	**Technology & 21st C Skills Integration (Specify)**	**NJSLS w/ CPI Reference**	**Evaluation/ Assessment:**
							conditions and employment opportunities for selected careers. 3. Students present oak tag model of lab.

Unit Modifications for Special Population Students:

Struggling Learners	Gifted and Talented Students (Challenge Activities)	English Language Learners	Special Education Students
1. Students are partnered with another student to help with egress procedures	1. Students list how math and science requirements for architecture differ from construction management careers		1. Students are partnered with another student to help with egress procedures
2. Teacher groups students according to ability to allow gifted students to assist struggling students with use of technology and content of OOH site			2. Teacher groups students according to ability to allow gifted students to assist struggling students with use of technology and content of OOH site

Struggling Learners	Gifted and Talented Students (Challenge Activities)	English Language Learners	Learners with an IEP	Learners with a 504
• Assist students in getting organized. • Give short directions. • Use drill exercises. • Give prompt cues during student performance. • Let students with poor writing skills use a computer. • Break assignments into small segments and assign only one segment at a time. • Demonstrate skills and have students model them. • Give prompt feedback. • Use continuous assessment to mark students' daily progress. • Prepare materials at varying levels of ability.	• Provide ample opportunities for creative behavior. • Create assignments that call for original work, independent learning, critical thinking, problem solving, and experimentation. • Show appreciation for creative efforts • Respect unusual questions, ideas, and solutions. • Encourage students to test their ideas. • Provide opportunities and give credit for self-initiated learning. • Avoid overly detailed supervision and too much reliance on prescribed curricula. • Allow time for reflection. • Resist immediate and constant evaluation. • Avoid comparisons to other students.	• Use a slow, but natural rate of speech; speak clearly; use shorter sentences; repeat concepts in several ways. • When possible, use pictures, photos, and charts. • Corrections should be limited and appropriate. Do not correct grammar or usage errors in front of the class. • Give honest praise and positive feedback through your voice tones and visual articulation whenever possible. • Encourage students to use language to communicate, allowing them to use their native language to ask/answer questions when they are unable to do so in English. • Integrate students' cultural background into class discussions. • Use cooperative learning where students have opportunities to practice expressing ideas without risking language errors in front of the entire class.	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student	• Refer to page four in the Parent and Educator Guide to Section 504 to assist in the development of appropriate plans.

			engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org	

UNIT OVERVIEW

Course Title: **Architectural Design Systems**

Unit #: **UNIT 2** **Unit Title:** **Architectural Design Fundamentals**

Unit Description and Objectives:
The principal method for communicating ideas in the realm of architecture is the drawing. Today most drawings are produced by computer programs however the student must still understand the components of these documents. This unit provides the information to help the student with these components as well as becoming proficient in the use of the software designed for Architecture.

Essential Questions and Enduring Understandings:

Essential Questions:	**Enduring Understandings/Generalizations Students will understand that:**	**Guiding Questions**
1. Why is understanding drawing standards important if we mostly use the computer for design?	1. Drawing standards are used to convey technical data and construction details not readily discernable from a 3-D model.	1.1 Why is it important to understand the relationship of the views of an object in a technical drawing? 1.2 What does “foreshortened” mean? 1.3 What is the alphabet of lines?
2. How are size, scale and ratio related and yet different?	2. A ratio uses like units while a scale can use different units for a representation of an object’s size.	2.1 How is proportion related to scale? 2.2 Is scale always used? Why or why not? 2.3 Is 1:24,000 a scale or a ratio? Why?
3. What is orthographic projection?	3. Orthographic is the projection of an objects edges onto mutually perpendicular planes allowing the accurate size and shape description of and object.	3.1 Is a circular shape always represented as a circle? Why or why not?
4. What is “workflow”?	4. The order in which design tasks are executed affects the efficiency of the process or workflow.	4.1 Why is it import to research the design problem prior to starting to formulate a solution?

UNIT GRAPHIC ORGANIZER

Sub-Concept/Topics:

Architectural

Symbols

Sub-Concept/Topics:

Scale /Ratios

Sub-Concept/Topics:

Planes of projection

Theme:

Conceptual Lens:

It's important to convey design intent through accurate graphic representation of the design.

Sub-Concept/Topics:

Drawing vs. Sketching

Sub-Concept/Topics:

Proportion

CURRICULUM UNIT PLAN

Course Title/Grade: Architectural Design Systems

Unit Number/Title: II **Architectural Design Fundamentals**

Conceptual Lens: It's important to convey design intent through accurate graphic representation of the design.

Appropriate Time Allocation (# of Days)**:** 10

Primary Content Standards referenced With Cumulative Progress Indicators			
8.2.12.B.1	9.3.12.AC.6		
8.2.12.C.5			
9.3.12.AC.1			

Topics/Concepts (Incl. time / # days per topic)	**Critical Content (Students Will Know :)**	**Skill Objectives (Students Will Be Able To :)**	**Instructional/Learning Activities & Interdisciplinary Connections**	**Instructional Resources**	**Technology & 21st C Skills Integration (Specify)**	**NJSLS w/ CPI Reference**	**Evaluation/ Assessment:**
1. Sketching 2. Mechanical Drawing 3. Scale/Ratio/Proportion 4. Symbols used in Architectural Drawing 5. Views and planes of projection	1. Why standards are critical for consistent and accurate concept conveyance. 2. Why sketching is an important skill to develop 3. Scale, ratio and proportion are related to accurate drawing and sketching	1. Use pencil and paper to sketch a representation of a given room in plan view 2. Insert the appropriate symbols to depict doors, windows and other features 3. Maintain the proportionality of an object through the use of scale 4. Identify the ratio of a given scale	1. Students use graph paper to sketch the classroom to scale including the symbols for doors , mechanical elements, lighting and windows in plan view 2. *Students apply scale, ratio and proportion to their floor plans.*	1. Graph paper 2. Pencils 3. Erasers 4. Tape measures	P21 Standards 1. Communication And Collaboration 2. Creativity And Innovation 3. Information, Media And Technology Skills ISTE Standards 1. Creativity and innovation 2. Critical thinking, problem solving and decision making 3. Technology operations and concepts	8.2.12.B.1 8.2.12.C.5 9.3.12.AC.1 9.3.12.AC.6	**Formative Assessments:** Students present and discuss progress of floor plans with the class on a weekly basis and garner feedback related to their progress and strength of design. **Summative Assessment(s)** Floor plans are evaluated at the conclusion of the activity for: 1. Scale 2. Symbols 3. Accuracy in furniture placement

Topics/Concepts **(Incl. time / # days per topic)**	**Critical Content** **(Students Will Know :)**	**Skill Objectives** **(Students Will Be Able To :)**	**Instructional/Learning Activities & Interdisciplinary Connections**	**Instructional Resources**	**Technology & 21st C Skills Integration (Specify)**	**NJSLS w/ CPI Reference**	**Evaluation/ Assessment:**
							4. Accuracy in door and window location 5. Conversion of scale to ratio

Unit Modifications for Special Population Students:

Struggling Learners	Gifted and Talented Students (Challenge Activities)	English Language Learners	Learners with an IEP	Learners with a 504
1. Students are partnered with another student to help with egress procedures	1. Students can opt to draw room, hallway and main office	1. use on-line translation as needed	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning	• Refer to page four in the Parent and Educator Guide to Section 504 to assist in the development of appropriate plans.
2. Teacher groups students according to ability to allow gifted students to assist struggling students with use of measuring tools		2. Work with ELL teacher to develop strategy to allow ELL students to have success.		
3. Teacher is available for after school help				

			Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org	

UNIT OVERVIEW

Course Title: **Architectural Design Systems**

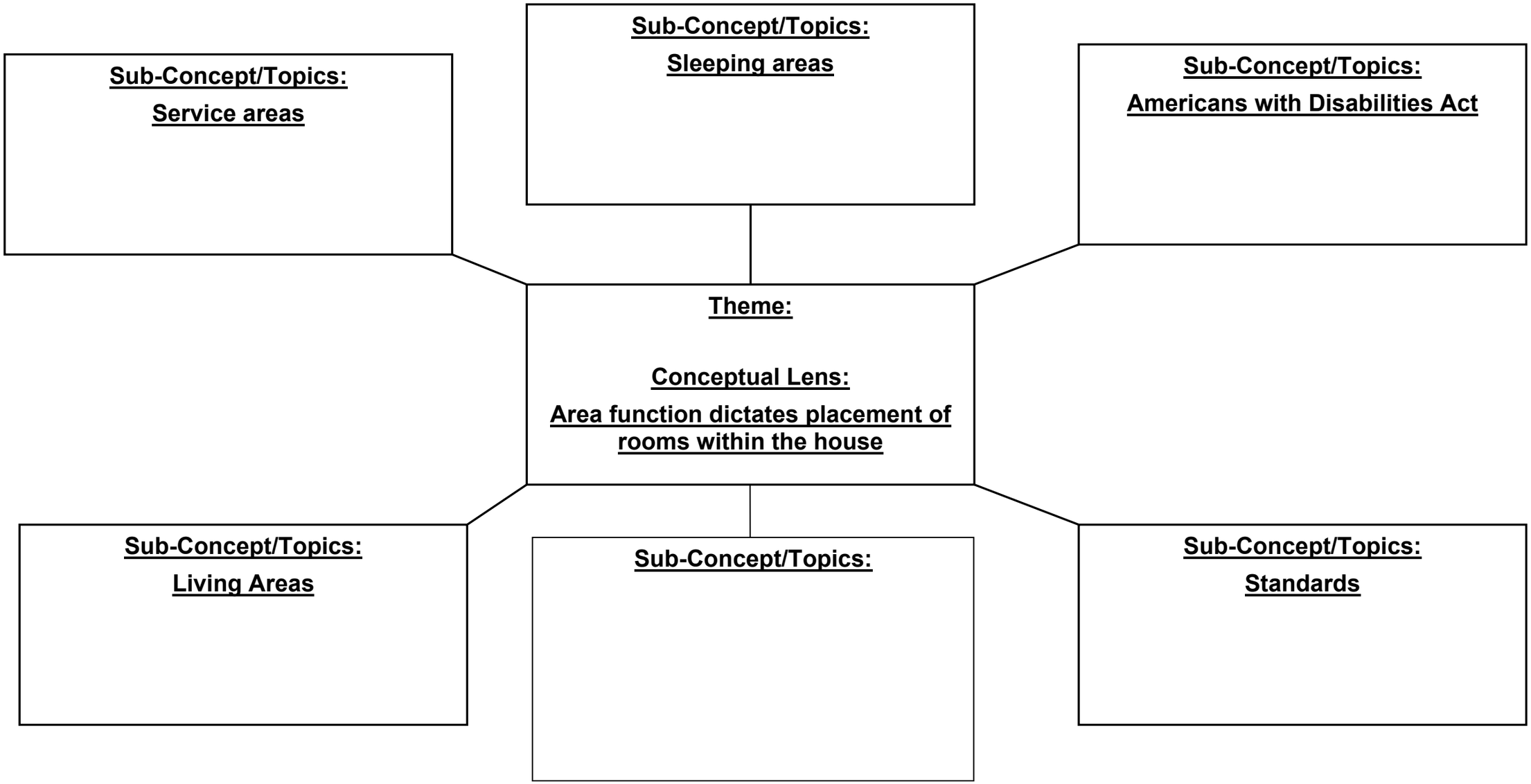
Unit #: **UNIT 3** **Unit Title:** **Room and Space Planning**

Unit Description and Objectives:
A residential structure can be divided into three basic areas: the sleeping area, living area and the service area. These basic areas are further divided into rooms. This unit deals with these rooms, their use, design, and function

Essential Questions and Enduring Understandings:

Essential Questions:	**Enduring Understandings/Generalizations Students will understand that:**	**Guiding Questions**
1. What is the difference between a room and an area?	1. A residential structure is divided into three basic areas. 2. These areas are further divided into rooms 3. The living area of the house is the part that most friend and guests see. 4. Outdoor spaces may also be considered as living spaces.	1.1 What are the three basic areas into which a residential structure can be divided? 1.2 In bathrooms which two electrical safety concerns must be addressed? 1.3 How can outdoor living spaces be defined? 1.4 How does a porch differ from a patio?
2. Why is it important to understand the function of an area in terms of its layout?	1. Placement of rooms is associated with their area's function	2.1 Would it be a good idea to put sleeping areas next to service areas? 2.2 How many bathrooms should a home have? 2.3
3. Why is the Americans with Disabilities Act important to an Architect?	1. Many people for varying reasons have the need for accessibility that directly impinges on the design of a room, area and residence as well as public places.	3.1 What is the ADA? 3.2 What is a standard door width for ADA compliance? 3.4 What is a typical dining table height?

UNIT GRAPHIC ORGANIZER



CURRICULUM UNIT PLAN

Course Title/Grade: Architectural Design Systems

Unit Number/Title: Unit 3 Room and Space Planning

Conceptual Lens: Area function dictates placement of rooms within the house

Appropriate Time Allocation (# of Days): 25

Primary Content Standards referenced With Cumulative Progress Indicators			
8.2.12.B.1	8.2.12.D.3	9.3.12.AC.3	
8.2.12.C.5	8.2.12.G.1		
8.2.12.D.1	9.3.12.AC.1		

Topics/Concepts (Incl. time / # days per topic)	**Critical Content (Students Will Know :)**	**Skill Objectives (Students Will Be Able To :)**	**Instructional/Learning Activities & Interdisciplinary Connections**	**Instructional Resources**	**Technology & 21st C Skills Integration (Specify)**	**NJSLS w/ CPI Reference**	**Evaluation/ Assessment:**
Areas of a Residence 1. Sleeping Area a. Bedrooms b. Bathrooms 2. Living Area a. Living rooms b. Dining Rooms c. Entry Way d. Family e. Recreation f. Special Purpose g. Patios and Porches 3. Service Area a. Kitchen b. Garage c. Clothes Care	1. What the three areas of a residence are 2. Sleeping areas may include bedrooms and bathrooms 3. Living areas contain living rooms, dining rooms, entry ways, family rooms, special purpose rooms, patios and porches 4. Service areas	1. Discuss the factors that are central to the layout and design of bedrooms 2. Discuss the factors that are central to the layout and design of bathrooms 3. Plan and locate closets 4. List accessible requirements to make a bathroom ADA compliant 5. Identify the rooms that comprise the living area	1. Students develop floor plans for each of the three types of areas in a residential house. 2. Students obtain floor plans from the internet and rework them to improve one or more aspects of the plan to meet ADA requirements. *3. Measurement, area, volume, triangles*	Internet, Graph paper, Reference materials related to human dimension and interior space	P21 Framework 1. Creativity And Innovation 2. Critical Thinking And Problem Solving 3. Communication And Collaboration	8.2.12.B.1 8.2.12.C.5 8.2.12.D.1 8.2.12.D.3 8.2.12.G.1 9.3.12.AC.1 9.3.12.AC.3 NJSLS.ELA-LITERACY.RST.9-10.1 NJSLS.ELA-LITERACY.RST.9-10.3 NJSLS.ELA-LITERACY.RST.9-10.4 NJSLS.ELA-LITERACY.RST.9-10.7 NJSLS.ELA-LITERACY.RST.11-12.4 NJSLS.ELA-LITERACY.RST.11-12.7	**Formative Assessments:** 1. Students present floor plans for each of the three areas in their residential house design layout 2. Students make suggestions to classmates for improving area floor plans **Summative Assessment(s)** 1. Student area plans are evaluated based on the following: 2.. Scale 3. Logic of layout 4. Incorporation of accessible design factors in entry way, bathroom, and kitchen.

Topics/Concepts (Incl. time / # days per topic)	**Critical Content (Students Will Know :)**	**Skill Objectives (Students Will Be Able To :)**	**Instructional/Learning Activities & Interdisciplinary Connections**	**Instructional Resources**	**Technology & 21st C Skills Integration (Specify)**	**NJSLS w/ CPI Reference**	**Evaluation/ Assessment:**
	contain kitchens, garages and clothes care.	6. Account for furniture in the planning and space requirements of different rooms 7. Design a functional foyer and entry 8. Design a kitchen that meets acceptable work triangle dimensions					
4. Accessibility	1. the Americans with Disabilities Act of 1990 set minimum requirements – both scoping and technical -- for newly designed and constructed or altered State and local government facilities, public accommodations, and commercial facilities to be readily accessible to and usable by individuals with disabilities.	1. Identify areas in a residence where accessibility is important. 2. Layout and design a space for accessibility.					

Unit Modifications for Special Population Students:

Struggling Learners	Gifted and Talented Students (Challenge Activities)	English Language Learners	Learners with an IEP	Learners with a 504
1. Students are partnered with another student to help with egress procedures	1. Students can opt to draw their own kitchen and redesign the work triangle	1. use on-line translation as needed	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning	• Refer to page four in the Parent and Educator Guide to Section 504 to assist in the development of appropriate plans.
2. Teacher groups students according to ability to allow gifted students to assist struggling students with use of measuring tools	2. Students may take above redesign and specify their own cabinets and appliances	2. Work with ELL teacher to develop strategy to allow ELL students to have success.		
3. Teacher is available for after school help				

			Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org	

UNIT OVERVIEW

Course Title: **Architectural Design Systems**

Unit #: **UNIT 4** **Unit Title:** Plot Plans and Foundations

Unit Description and Objectives:
A plot plan is a plan view drawing that shows the site and location/ orientation of the buildings on the property while the site plan only shows information about the property. A foundation is crucial to the stability of a building and is the first part of the building to be placed on the site. It is crucial the foundation be built and located accurately.

Essential Questions and Enduring Understandings:

Essential Questions:	**Enduring Understandings/Generalizations Students will understand that:**	**Guiding Questions**
1. What are the various features shown on a typical plot plan?	1. A plot plan is a top view drawing that shows the site and location of the buildings on the property.	1.1 How do property lines and contour lines differ? 1.2 What is used to describe topography? 1.3 How are topographical features shown on a plot and site plan?
2. How do you locate a building on a plot plan?	2. The site plans present only information about the property and the utilities.	2.1 What is a level? 2.2 What is the difference between a transit and a level? 2.3 What is a benchmark? 2.4 How are the bearings of a site plan measured and described?
3. What are topographical features?	3. Topographical features include trees, shrubs, streams, roads, utilities, fences and similar features	3.1 What items are not included in topographical features? 3.2 How should a non-standard symbol be handled on a plot plan?
4. How do you stake out a house location?	4. The foundation plan is a plan view drawing that provides all the information necessary to construct the foundation.	4.1 What role do zoning laws play in a structure's location on the building site?
5. What determines footing shape and size?	5. Footings increase the supporting capacity of the foundation wall by spreading the load over a larger area.	5.1 What is the relationship between a footing's width and the thickness of the foundation wall?
6. What are the steps to drawing a foundation plan?	6. It is crucial to locate the corners of the foundation prior to excavation.	6.1 How are the corners of a foundation located? 6.2 What are batter boards?

UNIT GRAPHIC ORGANIZER

Sub-Concept/Topics:

Plot plans

Sub-Concept/Topics:

Site plans

Sub-Concept/Topics:

Surveying

Theme:

Conceptual Lens:

Location of the building foundation is predicated upon accurate data derived from site and plot plans

Sub-Concept/Topics:

Masonry

Sub-Concept/Topics:

Live and Dead loads

Sub-Concept/Topics:

Foundations

CURRICULUM UNIT PLAN

Course Title/Grade: Architectural Design Systems

Unit Number/Title: 4 Plot Plans and Foundations

Conceptual Lens: Location of the building foundation is predicated upon accurate data derived from site and plot plans

Appropriate Time Allocation (# of Days): 20

Primary Content Standards referenced With Cumulative Progress Indicators			
8.2.12.A.1	8.2.12.B.3	8.2.12.E.1	9.3.12.AC.2
8.2.12.B.1	8.2.12.C.3	8.2.12.F.3	9.3.12.AC.6
8.2.12.B.2	8.2.12.D.1	9.3.12.AC.1	9.3.12.AC-DES.1 9.3.12.AC-DES.2

Topics/Concepts (Incl. time / # days per topic)	**Critical Content (Students Will Know :)**	**Skill Objectives (Students Will Be Able To :)**	**Instructional/Learning Activities & Interdisciplinary Connections**	**Instructional Resources**	**Technology & 21st C Skills Integration (Specify)**	**NJSLS w/ CPI Reference**	**Evaluation/ Assessment:**
1. Plot Plans a. property lines b. Contour Lines c. Topographical features 2. Footings and Foundations a. Excavation b. Footing shapes c. Foundation Walls d. Beams and Girders e. live load f. Dead load 3. Surveying a. Transit vs. Level b. instrument setup c.	1. The difference between a plot and site plan 2. The types of lines that are used to identify property from contour lines 3. The symbols that represent topographical features. 4. The key	1. Set up the transit/level 2. Use the transit/level to locate property, building, and excavation lines. 3. Create a site and plot plan from given data. 4. Include contour lines in the site and plot plans. 5. Use	1. Given a specific location students research information regarding site conditions such as soil type, frost line and elevation and topography and develop a site specific plot plan. 2. Students are given a transit level and a site and locate building corners, property lines and elevations and draw the resultant plot	• Internet • Transit/Level • Stadia rod • 100 foot tape measures • Revit software	**P21Framework** 1. Creativity And Innovation 2. Critical Thinking And Problem Solving 3. Communication And Collaboration 4. Information Literacy 5. Ict (Information, Communications And Technology) Literacy 6. Initiative And Self-Direction 7. Productivity And Accountability **ISTE Standards** 1. Creativity and	8.2.12.A.1 8.2.12.B.1 8.2.12.B.2 8.2.12.B.3 8.2.12.C.3 8.2.12.D.1 8.2.12.E.1 8.2.12.F.3 9.3.12.AC.1 9.3.12.AC.2 9.3.12.AC.6 9.3.12.AC-DES.1 9.3.12.AC-DES.2 NJSLS.MATH.CONTENT.HSG.SRT.C.6 NJSLS.MATH.CONTENT.HSG.SRT.C.7 NJSLS.MATH.CONTENT.HSG.SRT.C.8	**Formative Assessments:** 1. Given site data students will develop a sketch of a plot plan that contains property lines, contour lines, topographical symbols and appropriate scale. 2. Students apply surveying concepts by using the transit level to layout and identify building corners and

Topics/Concepts (Incl. time / # days per topic)	**Critical Content (Students Will Know :)**	**Skill Objectives (Students Will Be Able To :)**	**Instructional/Learning Activities & Interdisciplinary Connections**	**Instructional Resources**	**Technology & 21st C Skills Integration (Specify)**	**NJSLS w/ CPI Reference**	**Evaluation/ Assessment:**
Determining elevations d. Determining property line locations e. using accepted practices to identify property lines using bearings	factors for creating a foundation excavation 5. The various types of foundation walls and their appropriate application for a given set of conditions 6. How to set up and use the transit/level to identify property lines, building lines and excavation lines through	accepted practice to identify property lines using bearings. 6. Explain the difference between a contour and property line. 7. Determine the height of a structure using the transit level. 8. Identify the type of foundation most appropriate to a given set of site conditions. 9. Define both dead	plan on graph paper. 3. Students use Revit software to convert sketched plans to computer aided designs.		innovation 2. Communication and collaboration 3. Research and information fluency 4. Critical thinking, problem solving, and decision making		site elevations. 3. Students make decisions regarding type and size of footing and foundation wall by using given data about a specific building site. **Summative Assessment(s)** Students create a foundation plan that includes: 1. Type of foundation wall and reasons for using it over other possibilities 2. Elevations of each of the four corners of their foundation 3. Locations of columns and beams based on span data 4. Justifications for dimensional

Topics/Concepts (Incl. time / # days per topic)	**Critical Content (Students Will Know :)**	**Skill Objectives (Students Will Be Able To :)**	**Instructional/Learning Activities & Interdisciplinary Connections**	**Instructional Resources**	**Technology & 21st C Skills Integration (Specify)**	**NJSLS w/ CPI Reference**	**Evaluation/ Assessment:**
	the placement of batter boards. 7. The difference between a live and dead load 8. Basic trigonometry as it applies to surveying.	and live loads.					decisions relating to the size and shape of the footings based on given soil conditions.

Unit Modifications for Special Population Students:

Struggling Learners	Gifted and Talented Students (Challenge Activities)	English Language Learners	Learners with an IEP	Learners with a 504
1. Students are partnered with another student to help with egress procedures	1. Students do beam and post load calculations	1. use on-line translation as needed	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the	• Refer to page four in the Parent and Educator Guide to Section 504 to assist in the development of appropriate plans.
2. Teacher groups students according to ability to allow gifted students to assist struggling students with use of measuring tools	2. Students may take above redesign and specify their own mixture for increasing the psi strength of concrete from 2500psi to 4000 psi	2. Work with ELL teacher to develop strategy to allow ELL students to have success.		
3. Teacher is available for after school help	3. Students identify topics in their physics class that would be appropriate to the calculation of structural loads for their foundation design.			

			Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org	

UNIT OVERVIEW

Course Title: **Architectural Design Systems**

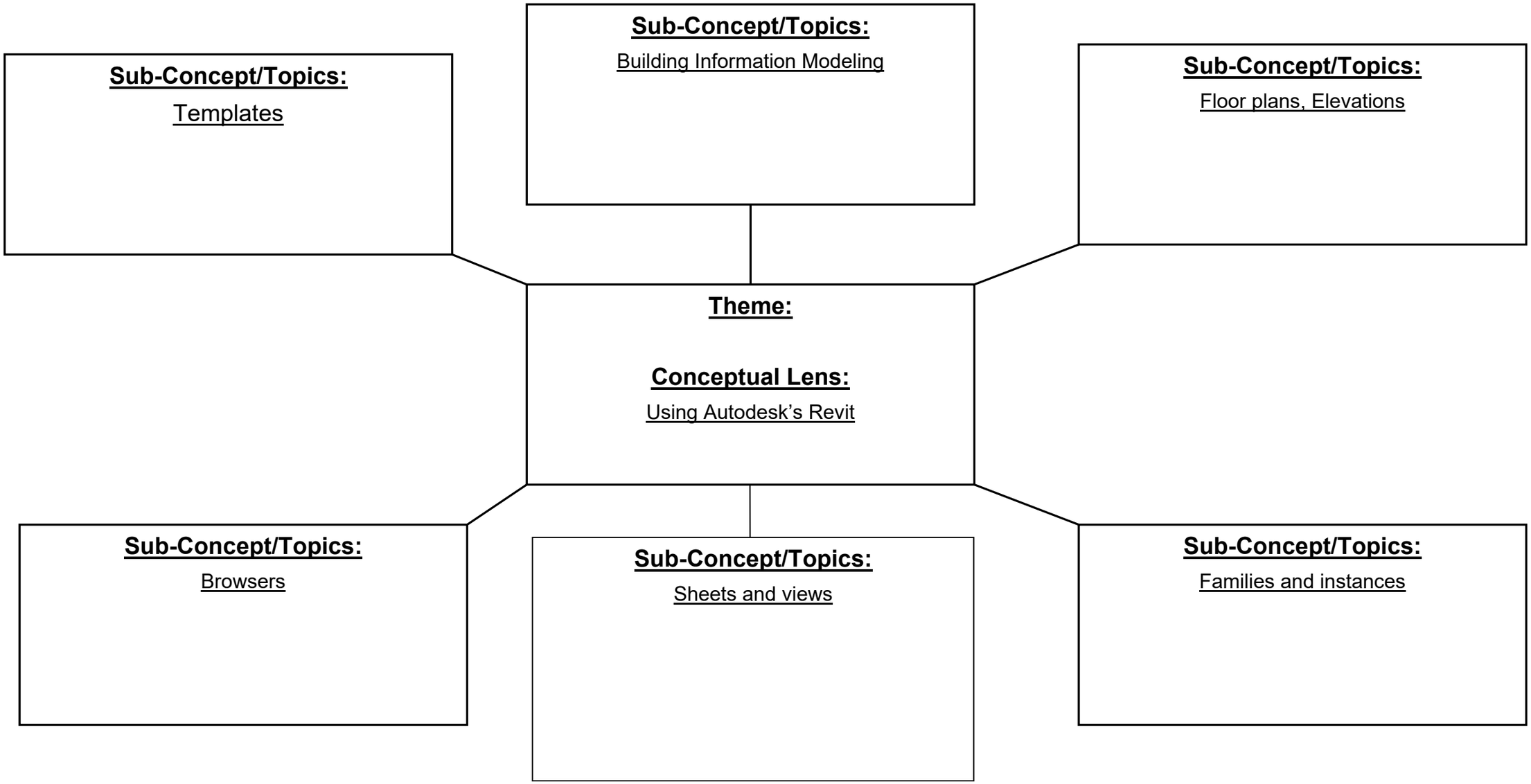
Unit #: **UNIT 5** **Unit Title:** Formulating a Design

Unit Description and Objectives:
Students learn how to create and document a design in the building information modeling software from Autodesk called Revit.

Essential Questions and Enduring Understandings:

Essential Questions:	**Enduring Understandings/Generalizations Students will understand that:**	**Guiding Questions**
1. What is BIM?	1.1 BIM is an acronym for Building Information Modeling 1.2 BIM contains many levels of information about a building and is designed to allow a greater efficiency and streamlined workflow for the design professional.	1.1 How does BIM influence a designer's workflow? 1.2 How can the design of a heating system be more efficient through the use of BIM?
2. How is BIM different from conventionally used design software?	2.1. Conventional design or CAD software is more dependent on the input of the designer for every phase of building design. 2.2 BIM software introduces many design environments that allow for much greater depth of analysis of building systems.	2.1 What happens to the information concerning a wall's composition if it is edited in CAD vs. BIM? 2.2 What are the different design environments in Revit?
3. Why should an architect be familiar with traditional CAD and BIM?	3.1 many design firms still use traditional CAD systems because they have extensive archives of older files.	3.1 Where is AutoCAD used?

UNIT GRAPHIC ORGANIZER



CURRICULUM UNIT PLAN

Course Title/Grade: Architectural Design Systems
Unit Number/Title: 5 Formulating a Plan
Conceptual Lens: Using Autodesk's Revit Software
Appropriate Time Allocation (# of Days)**:** 30

Primary Content Standards referenced With Cumulative Progress Indicators			
8.2.12.A.1	8.2.12.D.1		
8.2.12.B.3	8.2.12.E.1		
8.2.12.C.3	8.2.12.F.1		

Topics/Concepts (Incl. time / # days per topic)	Critical Content (Students Will Know :)	Skill Objectives (Students Will Be Able To :)	Instructional/Learning Activities & Interdisciplinary Connections	Instructional Resources	Technology & 21st C Skills Integration (Specify)	NJSLS w/ CPI Reference	Evaluation/ Assessment:
1. Introduction to Revit 2. Templates 3. Browsers 4. Floor Plans 5. Elevations 6. Families 7. Sheets 8. Environments a. Structure b. Systems c. Analyze d. Massing and Site	1. What BIM is and how it differs from traditional CAD 2. How to choose a Revit template depending upon the design intent. 3. How to use the properties and project browser to navigate	1. Open, work in and save a Revit file to their mapped network drive. 2. Select a Revit template based on the design intent of their model. 3. Open a Revit Family and insert a specific type into	1. Students take previously sketched plan view of the design lab and enter it into Revit Building Information Modeling software.	1. Internet for research as needed as well as use of Revit's online help menu. 2. Revit software 3. Functioning intranet for Revit license retrieval.	**P21Framework** 1. Creativity And Innovation 2. Critical Thinking And Problem Solving 3. Communication And Collaboration 4. Information Literacy 5. Ict (Information, Communications And Technology) Literacy 6. Initiative And Self-Direction 7. Productivity And Accountability **ISTE Standards** 1. Creativity and	8.2.12.A.1 8.2.12.B.3 8.2.12.C.3 8.2.12.D.1 8.2.12.E.18.2.12.F.1 NJSLS.ELA-LITERACY.RST.11-12.1 NJSLS.ELA-LITERACY.RST.11-12.2 NJSLS.ELA-LITERACY.RST.11-12.3 NJSLS.ELA-LITERACY.RST.11-12.4 NJSLS.ELA-LITERACY.RST.11-12.5 NJSLS.MATH.CONTENT.HSF.TF.B.7 NJSLS.MATH.CONTENT.HSG.GMD.B.4	**Formative Assessments:** 1. Students present designs for week peer review as well as teacher evaluation 2. Students insert appropriate family types into their design. 3. Students generate plan and elevation views of their design

Topics/Concepts (Incl. time / # days per topic)	Critical Content (Students Will Know :)	Skill Objectives (Students Will Be Able To :)	Instructional/Learning Activities & Interdisciplinary Connections	Instructional Resources	Technology & 21st C Skills Integration (Specify)	NJSLS w/ CPI Reference	Evaluation/ Assessment:
	through their design. 4. How to insert a view into a sheet and modify its visual content to achieve the desired result. 5. That an elevation is a view of the building's vertical plane 6. The difference between an elevation and a plan view. 7. Different environments allow content	their building model. 4. Navigate to various parts of their building model using the properties and project browsers. 5. Navigate between elevations and plan views to allow for appropriate work planes to be used. 6. Create new elevations and plan views as needed. 7. Be able to use a variety of			innovation 2. Communication and collaboration 3. Research and information fluency 4. Critical thinking, problem solving, and decision making		using Revit. **Summative Assessment(s)** Students turn in Revit files and have them evaluated for inclusion of: 1. Properly defined walls that show the appropriate cmu's used to represent the wall structure of the 9/10 exterior and interior. 2. Properly constructed elevations that have appropriately labeled levels 3. Properly formatted plan views. 4. Students demonstrate ability to navigate

Topics/Concepts (Incl. time / # days per topic)	Critical Content (Students Will Know :)	Skill Objectives (Students Will Be Able To :)	Instructional/Learning Activities & Interdisciplinary Connections	Instructional Resources	Technology & 21st C Skills Integration (Specify)	NJSLS w/ CPI Reference	Evaluation/ Assessment:
	specific tools to be applied to their design.	environments to perform analysis of their building model. 8. Use the massing and site environment to create site and plot plans.					property and project browsers by demonstrating the location of various elements during a classroom presentation. 5. Student generated elevations are evaluated for proper view references, scale and viewport. 6. Student generated plot and site plans contain information to include: a. Contour lines with elevations b. Location of building on site

Topics/Concepts (Incl. time / # days per topic)	**Critical Content (Students Will Know :)**	**Skill Objectives (Students Will Be Able To :)**	**Instructional/Learning Activities & Interdisciplinary Connections**	**Instructional Resources**	**Technology & 21st C Skills Integration (Specify)**	**NJSLS w/ CPI Reference**	**Evaluation/ Assessment:**
							c. Trees, fences, utilities, roads and other pertinent information germane to plot and site planning.

Unit Modifications for Special Population Students:

Struggling Learners	Gifted and Talented Students (Challenge Activities)	English Language Learners	Learners with an IEP	Learners with a 504
1. Students are partnered with another student to help with BIM concepts	1. Students do property line layouts and label each according to recognized standards used in the labeling of property lines.	1. use on-line translation as needed	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines	• Refer to page four in the Parent and Educator Guide to Section 504 to assist in the development of appropriate plans.
2. Teacher groups students according to ability to allow gifted students to assist struggling students with use of Revit software.	2. Students calculate cut and fill amounts for site preparation to allow for a building pad and driveway.	2. Work with ELL teacher to develop strategy to allow ELL students to have success.		
3. Teacher is available for after school help	3. Students identify materials necessary to augment site preparation in order to facilitate concrete driveway construction			

			offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org	

UNIT OVERVIEW

Course Title: **Architectural Design Systems**

Unit #: **UNIT 6 OVERVIEW** **Unit Title:** Construction Systems

Unit Description and Objectives:
This unit delves into the types of systems applied to the construction of a structure from the attachment of the structural members to the foundation up to the roof. Types of framing using conventional framing materials as well as steel, trusses, engineered wood products, oriented strand board, parallel strand lumber and laminated veneer lumber will also be covered. Curtain walls, windows, doors and alternative building materials will also be discussed.

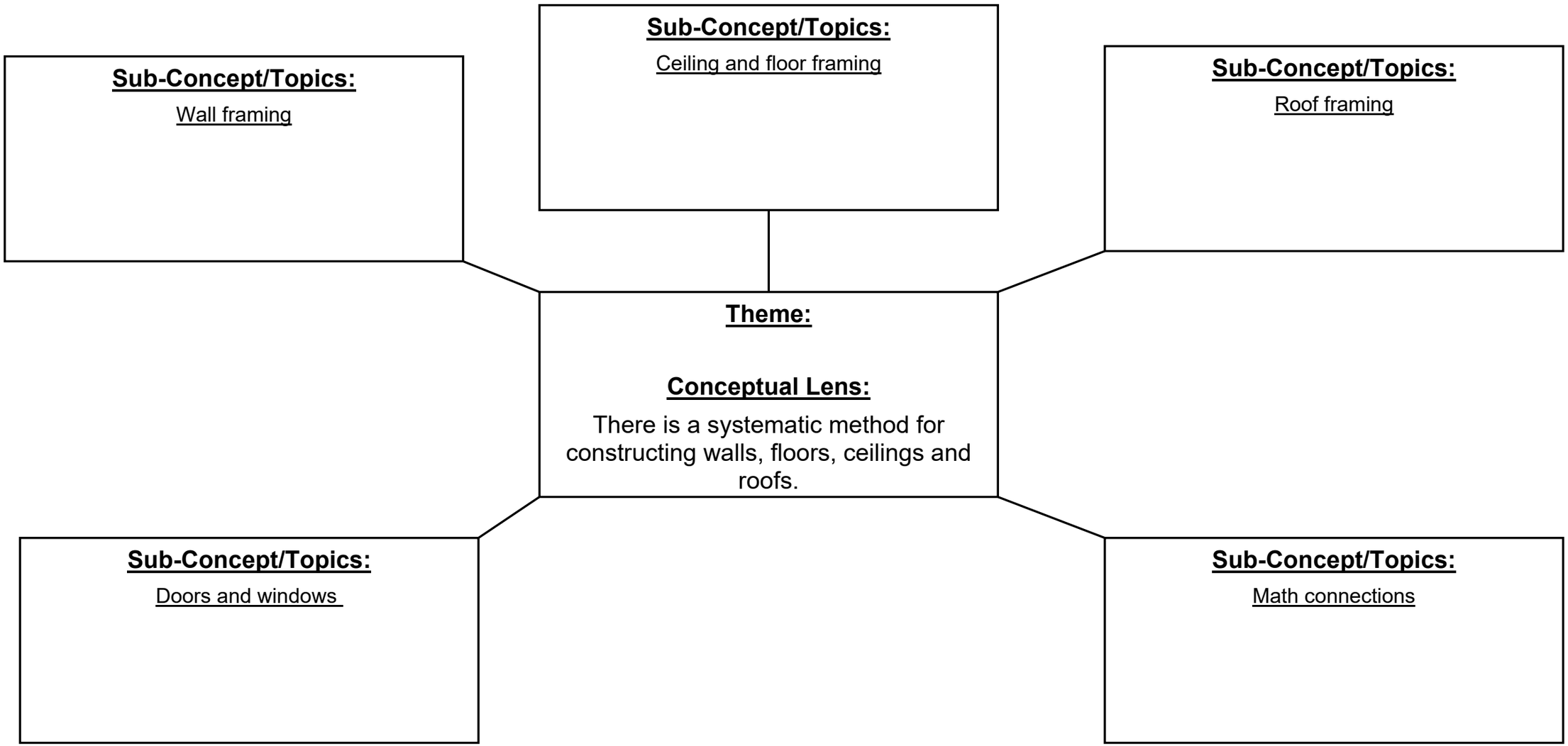
PLEASE NOTE THAT THE NEXT THREE PAGES ARE NEEDED FOR EACH UNIT. THEREFORE WE HAVE ADDED TEN OF THESE UNITS FOR YOU (UNITS 1 THROUGH 10) WHICH INCLUDE THE UNIT OVERVIEW, THE GRAPHIC ORGANIZER, AND THE CURRICULUM UNIT PLAN. IF NECESSARY, PLEASE DELETE ANY UNITS NOT USED. BUT BE CAREFUL WHEN DELETING BECAUSE THE LAST TWO PAGES ARE NECESSARY FOR THE COMPLETION OF EACH COURSE OF STUDY ("*Cross Content Standards Analysis" page* and *"Department of Student Personnel Services – Curriculum Modifications"* page.) THIS DOCUMENT IS SAVED AS A TEMPLATE. PLEASE DO A SAVE AS ON YOUR COMPUTER AND COPY BACK TO THE ORIGINAL DISK PROVIDED TO YOU.

Essential Questions and Enduring Understandings:

Essential Questions:	**Enduring Understandings/Generalizations Students will understand that:**	**Guiding Questions**
1. How is the framing of a structure attached to the foundation?	1. The sill plate is the point of attachment between the framing and foundation.	1.1 What is a "J" bolt? 1.2 What is the difference between a sill plate and sole plate? 1.3 How is the top of the foundation prepared to receive the sill plate?
2. What is the advantage of platform over balloon framing?	2.1 Platform framing has built in fire stops. 2.2 Platform framing affords the builders a safer working surface.	2.1 Why is a fire stop important? 2.2 What makes it more challenging to frame using the balloon method?
3. What is the difference between a beam and a joist?	3. Beams are larger structural members typically used to support joists and transfer the loads to columns and then to the foundation or earth.	3. Does a beam need to be composed of solid, one-piece lumber?
4. What advantage does engineered lumber have over conventional lumber?	4. Engineered lumber is made in controlled environments and allows for longer spans to be bridged without intermediate supports.	4. What is the difference between parallel strand lumber and laminated veneer lumber?
5. What increases the efficiency or R value of glazing?	5.1 R value is the resistance to heat flow. 5.2 The addition of panes and coatings can improve the	5.1 What is "R" value? 5.2 How is the "R" value related to energy loss or gain?

	R value of windows and doors.	
6. How are loads that span openings dealt with in relation to the framing of a wall?	6. Structural members called headers are used to span openings by increasing the amount of material to compensate for the additional loads they are required to carry.	6. What is the function of a header?
7. How is the efficiency of doors and windows measured?	7. Doors and windows have their efficiency measured in “R” values.	7. What makes multiple-paned windows and doors more efficient than single paned versions?
8. What is the difference between a rough opening and the units’ sizes?	8. The opening a door or window must fit into needs to be larger than the unit’s dimensions to compensate for any irregularities or inaccuracies in the framing of the structure and still allow for the unit to be plumb and level.	8.1 What is the difference between plumb and level? 8.2 Why is it important for a window and door to be installed both plumb and level?
9. What is the function of a roof system?	9. The purpose of a roof system is to protect the structure from the elements as well as adding an aesthetic that compliments the architectural style of the building.	9.1 What part of the country would benefit more from a shallower pitch roof and why? 9.2 Why would a steep pitch be employed?
10. How is rise and run related to slope?	10.1 Rise over run is the expression used to describe roof slope or pitch. 10.2 Pitch is given as the unit of rise over the unit of run. 10.3 The relationship of roof pitch can also be derived using some of the basic trigonometric functions.	10.1 What trigonometric function could be used to describe roof pitch? 10.2 Given a roof pitch, how could the angle of slope be derived?
11. What is the function of the four main rafter cuts?	11. Rafters typically contain a plumb cut, seat cut and tail cut.	11. What other rafter cut is parallel to the plumb cut?

UNIT GRAPHIC ORGANIZER



CURRICULUM UNIT PLAN

Course Title/Grade: Architectural Design Systems

Unit Number/Title: 6 construction Systems

Conceptual Lens: There is a systematic method for constructing walls, floors, ceilings and roofs.

Appropriate Time Allocation (# of Days): 30

Primary Content Standards referenced With Cumulative Progress Indicators			
8.2.12.A.1	8.2.12.B.1	8.2.12.B.2	8.2.12.D.1
8.2.12.E.1	8.2.12.F.1	8.2.12.F.2	8.2.12.F.3
8.2.12.G.1	9.3.12.AC.1	9.3.12.AC.2	9.3.12.AC.6

Topics/Concepts (Incl. time / # days per topic)	Critical Content (Students Will Know :)	Skill Objectives (Students Will Be Able To :)	Instructional/Learning Activities & Interdisciplinary Connections	Instructional Resources	Technology & 21st C Skills Integration (Specify)	NJSLS w/ CPI Reference	Evaluation/ Assessment:
1. Frame Wall Construction a. Platform framing b. Balloon framing c. Studs 1. wood 2. steel d. Headers e. Sills 2. Ceiling and Floor Construction a. Joists b. Trusses c. Beams d. Columns e. Subfloor f. Engineered lumber 3. Roof Construction	1. There is more than one framing method but the prevailing one is platform or western framing 2. There are a variety of materials used for wall construction including dimensional lumber and steel. 3. Joists are horizontal structural members. 4. Studs are vertical structural members.	1. Select a building design problem and generate a solution on the BIM software that addresses: a. Foundation design b. Sill and floor construction c. Door and window finish Schedules d. Roof type and slope e. Output the appropriate documentation in the form of elevations, plot and site plans, floor and roof plans. f. Use basic geometry to calculate rafter length.	Students are given the option of a teacher-generated design problem or identifying their own problem to solve to facilitate the generation of design solutions that incorporate the topics / concepts delineated under that section of this unit.	1. Internet 2. Intranet 3. Revit BIM software 4. Measuring tools 5. Paper and pencils for sketching preliminary ideas as needed	**P21Framework** 1. Creativity And Innovation 2. Critical Thinking And Problem Solving 3. Communication And Collaboration 4. Information Literacy 5. Ict (Information, Communications And Technology) Literacy 6. Initiative And Self-Direction 7. Productivity And Accountability **ISTE Standards** 1. Creativity and innovation 2. Communicatio	8.2.12.A.1 8.2.12.B.1 8.2.12.B.2 8.2.12.D.1 8.2.12.E.1 8.2.12.F.1 8.2.12.F.2 8.2.12.F.3 8.2.12.G.1 9.3.12.AC.1 9.3.12.AC.2 9.3.12.AC.6 NJSLS.ELA-LITERACY.RST.11-12.1 NJSLS.ELA-LITERACY.RST.11-12.2 NJSLS.ELA-LITERACY.RST.11-12.3 NJSLS.ELA-LITERACY.RST.11-12.4 NJSLS.ELA-LITERACY.RST.11-12.5 NJSLS.MATH.CONTENT.HSF.TF.B.7 NJSLS.MATH.CONTENT.HSG.GMD.B.4	**Formative Assessments:** Students present weekly project updat Students present critiques of peer designs **Summative Assessment(s)** 1. Students use Revit softwa to construct a vacation cab that includes 2. Framing plan with roof slo calculations 3. Finish schedule wit door and window families and dimensions 4. Engineered lumber used with span

Topics/Concepts (Incl. time / # days per topic)	Critical Content (Students Will Know :)	Skill Objectives (Students Will Be Able To :)	Instructional/Learning Activities & Interdisciplinary Connections	Instructional Resources	Technology & 21st C Skills Integration (Specify)	NJSLS w/ CPI Reference	Evaluation/ Assessment:
a. Rafters b. Trusses c. Slope d. Types of roofs 1. gable 2. Hip 3. Mansard 4. Flat 5. Gambrel 6.Shed 4. Doors and Windows a. Doors 1. Interior a. Flush b. Panel c. Bi-fold d. Sliding e. Pocket f. Double action g. Accordion h. French i. Dutch 2. Exterior a. Flush b. Panel c. Sliding 5. Windows	5. Plates attach floors to foundations and walls to floors. 6. Headers are structural members that allow the load to be transmitted across a wall opening and to the surrounding structure. 7.Beams are used to span distances between columns and typically support joists at an intermediate span. 8. Engineered wood products provide alternatives to traditional lumber and usually allow longer spans without the need for	g. Use basic trigonometric functions to calculate roof slope.			n and collaboration 3. Research and information fluency 4. Critical thinking, problem solving, and decision making		ratings

Topics/Concepts (Incl. time / # days per topic)	**Critical Content (Students Will Know :)**	**Skill Objectives (Students Will Be Able To :)**	**Instructional/Learning Activities & Interdisciplinary Connections**	**Instructional Resources**	**Technology & 21st C Skills Integration (Specify)**	**NJSLS w/ CPI Reference**	**Evaluation/ Assessment:**
a. Types 1. Sliding 2. Casement 3. Double hung 4. Awning 6. Engineered Lumber a. Trusses b. Parallel strand lumber c. laminated veneer lumber d. Oriented strand board	intermediate beams and columns. 9. There are a variety of roof styles that provide alternatives for climate and aesthetic conditions. 10. Rafters are the main framing member used to construct roofs. 11. Trigonometry and geometry are useful tools for solving roof geometry problems. 12. There are a variety of doors to meet different circumstances. 13. Window and door efficiencies are related to their ability to resist heat flow.						

Unit Modifications for Special Population Students:

Struggling Learners	Gifted and Talented Students (Challenge Activities)	English Language Learners	Learners with an IEP	Learners with a 504
1. Students are partnered with another student to help with BIM concepts	1. Students use trigonometric functions to calculate the length of a hip rafter.	1. use on-line translation as needed	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed	• Refer to page four in the Parent and Educator Guide to Section 504 to assist in the development of appropriate plans.
2. Teacher groups students according to ability to allow gifted students to assist struggling students with use of Revit software.	2. Students calculate beam dimensions for beams of various material compositions	2. Work with ELL teacher to develop strategy to allow ELL students to have success.		
3. Teacher is available for after school help	3. Students identify roof slopes most appropriate for a part of the country that receives 96” or more a year by calculating snow loads.			

			here. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org	

UNIT OVERVIEW

Course Title: **Architectural Design Systems**

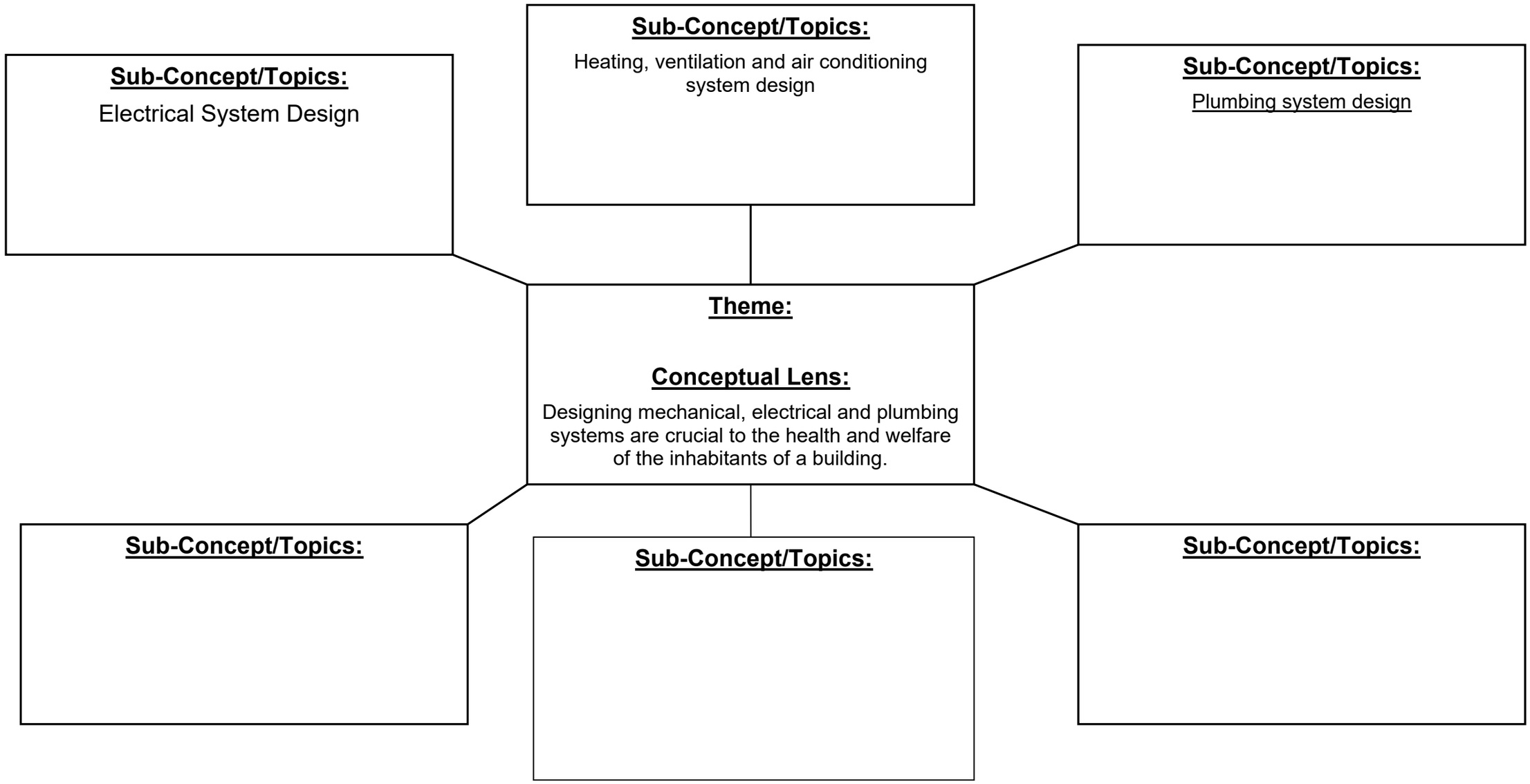
Unit #: **UNIT 7 OVERVIEW** **Unit Title:** **Electrical, Plumbing, and Mechanical Systems**

Unit Description and Objectives:
Mechanical systems control the heating, cooling and ventilation of a building and are particularly important in modern, tightly-constructed buildings. The goal of a building's mechanical systems is to provide thermal comfort and acceptable indoor air quality. Plumbing systems supply fresh, potable water and eliminate wastewater. Electrical systems distribute power throughout the building that is used to run all our electrical needs.

Essential Questions and Enduring Understandings:

Essential Questions:	**Enduring Understandings/Generalizations Students will understand that:**	**Guiding Questions**
1. Why is mechanical ventilation crucial for many commercial buildings?	1. Many buildings would struggle with indoor air quality without mechanical means of ventilation.	1.1 How do interior, windowless rooms receive fresh air? 1.2 What types of indoor air quality issues arise from trapped moisture? 1.3 Can a house be built too "tight"?
2. What size electrical service is required for a modern residence?	2. Modern residences require considerable more power than their counterparts of 50 years ago.	2.1 What is the relationship between a volt, ampere and ohm? 2.2 What is "power"? 2.3 How is electricity distributed throughout the building? 2.4 How is electrical power brought into the building?
3. Where are GFCI circuits required?	3. Ground fault circuit interrupters are placed in wet and damp locations to protect people from hazardous current. Conditions arising from moisture presence.	3.1 Why should a branch circuit in a cellar or basement be ground fault protected? 3.2 How many amperes should a bathroom branch circuit have?
4. Why are drain pipes larger than supply lines?	4. Drain lines need to take wastewater away from the residence without backing up.	4.1 What would happen if drain lines were the same size as supply lines? 4.2 How is water pressure maintained?
5. Where does the water in your house come from?	5. Most residences in our get their water from wells whether it be private or municipal.	5.1 Where does a water tower's water supply come from? 5.2 How is the water supply affected if there is a power loss?

UNIT GRAPHIC ORGANIZER



CURRICULUM UNIT PLAN

Course Title/Grade: Architectural Design Systems

Unit Number/Title: 7 Electrical, Plumbing, and Mechanical Systems

Conceptual Lens: Designing mechanical, electrical and plumbing systems are crucial to the health and welfare of the inhabitants of a building.

Designing mechanical, electrical and plumbing systems are crucial to the health and welfare of the inhabitants of a building.

Appropriate Time Allocation (# of Days): 23

Primary Content Standards referenced With Cumulative Progress Indicators			
8.2.12.A.1	8.2.12.B.1	8.2.12.B.2	8.2.12.D.1
8.2.12.E.1	8.2.12.F.1	8.2.12.F.2	8.2.12.F.3
8.2.12.G.1	9.3.12.AC.1	9.3.12.AC.2	9.3.12.AC.6

Topics/Concepts (Incl. time / # days per topic)	Critical Content (Students Will Know☺	Skill Objectives (Students Will Be Able To☺	Instructional/Learning Activities & Interdisciplinary Connections	Instructional Resources	Technology & 21st C Skills Integration (Specify)	NJSLS w/ CPI Reference	Evaluation/ Assessment:
1. Electrical Systems a. Service entrance and distribution panel b. Branch circuits c. Lighting d. Appliance circuits e. Outlets and switches f. Circuit calculations g. Ground Fault circuit Interrupter h. Low voltage systems	1. How to layout and size a residential electrical system 2. How to layout and design a residential plumbing	Define the following electrical terms: 1. Ampere 2. Volt 3. Ohm 4. Power 5. Watt 6. Branch circuit 7. GFCI circuit 8. Service entrance 9. Distribution panel Design the branch circuits required for a modern residential kitchen Determine what areas of a residence require GFCI circuits Design and layout a low	Students use previously designed models to add plumbing, electrical and HVAC plans	Internet Revit BIM software Schematics of relevant structures	**P21Framework** 1. Creativity And Innovation 2. Critical Thinking And Problem Solving 3. Communication And Collaboration 4. Information Literacy 5. Ict (Information, Communications And Technology) Literacy 6. Initiative And Self-Direction	8.2.12.A.1 8.2.12.B.1 8.2.12.B.2 8.2.12.D.1 8.2.12.E.1 8.2.12.F.1 8.2.12.F.2 8.2.12.F.3 8.2.12.G.1 9.3.12.AC.1 9.3.12.AC.2 9.3.12.AC.6 NJSLS.ELA-LITERACY.RST.11-12.1 NJSLS.ELA-LITERACY.RST.11-12.2 NJSLS.ELA-LITERACY.RST.11-12.3 NJSLS.ELA-LITERACY.RST.11-12.4 NJSLS.ELA-LITERACY.RST.11-12.5 NJSLS.MATH.CONTENT.HSF.TF.B.7 NJSLS.MATH.CONTENT.HSG.GMD.B.4	**Formative Assessments** 1. Students present weekly project updates with peer review 2. Students sketch electrical, plumbing and HVAC schematics of their previous unit's cabin design 3. Students debate

Topics/Concepts (Incl. time / # days per topic)	**Critical Content (Students Will Know☺**	**Skill Objectives (Students Will Be Able To☺**	**Instructional/Learning Activities & Interdisciplinary Connections**	**Instructional Resources**	**Technology & 21st C Skills Integration (Specify)**	**NJSLS w/ CPI Reference**	**Evaluation/ Assessment:**
i. Information and communication wiring 2. Plumbing Systems a. Water supply system b. In-house water treatment devices c. Water and waste removal d. Plumbing fixtures e. Water conservation f. Private sewage disposal 3. HVAC Systems a. Temperature control b. Humidity control c. Air circulation and cleaning d. Cooling systems e. Heating Systems f. Forced-air systems	system 3. How to layout and design a residential HVAC system using both hydronic and forced air systems	voltage lighting system for a patio or deck Describe the path their residential water supply takes from start to their faucets Determine the size of the wastewater pipes for a typical residence List the requirements for a septic system Describe the difference between a forced air heating system and a hydronic system Calculate the thermal loads on a 2500 square foot dwelling			7. Productivity And Accountability **ISTE Standards** 1. Creativity and innovation 2. Communication and collaboration 3. Research and information fluency 4. Critical thinking, problem solving, and decision making		forced hot air versus hydronic heating systems 4. Students debate heat pump benefit vs. cost **Summative Assessment(s)** 1. Students develop Revit model of cabin and apply electrical system design that includes service entrance, branch circuits and fixture locations 2. Student building model is created to include plumbing

Topics/Concepts (Incl. time / # days per topic)	**Critical Content (Students Will Know☺**	**Skill Objectives (Students Will Be Able To☺**	**Instructional/Learning Activities & Interdisciplinary Connections**	**Instructional Resources**	**Technology & 21st C Skills Integration (Specify)**	**NJSLS w/ CPI Reference**	**Evaluation/ Assessment:**
g. Hydronic systems h. Heat pumps i. Calculations for heat loss							plan with size of supply and drain lines as well as the vents for the system 3. Students calculate thermal loads on their design

Unit Modifications for Special Population Students:

Struggling Learners	Gifted and Talented Students (Challenge Activities)	English Language Learners	Learners with an IEP	Learners with a 504
1. Students are partnered with another student to help with BIM concepts	1. Students calculate load requirements for a commercial building of 10,000 ft2	1. use on-line translation as needed	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines	• Refer to page four in the Parent and Educator Guide to Section 504 to assist in the development of appropriate plans.
2. Teacher groups students according to ability to allow gifted students to assist struggling students with use of Revit software.	2. Students calculate flow amounts and derive drain pipe diameters for a public school that has a student population of 1000	2. Work with ELL teacher to develop strategy to allow ELL students to have success.		
3. Teacher is available for after school help	3. Students calculate savings their own households would realize if they augmented their heating system with a heat pump.			

			offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org	

UNIT OVERVIEW

Course Title: **Architectural Design Systems**

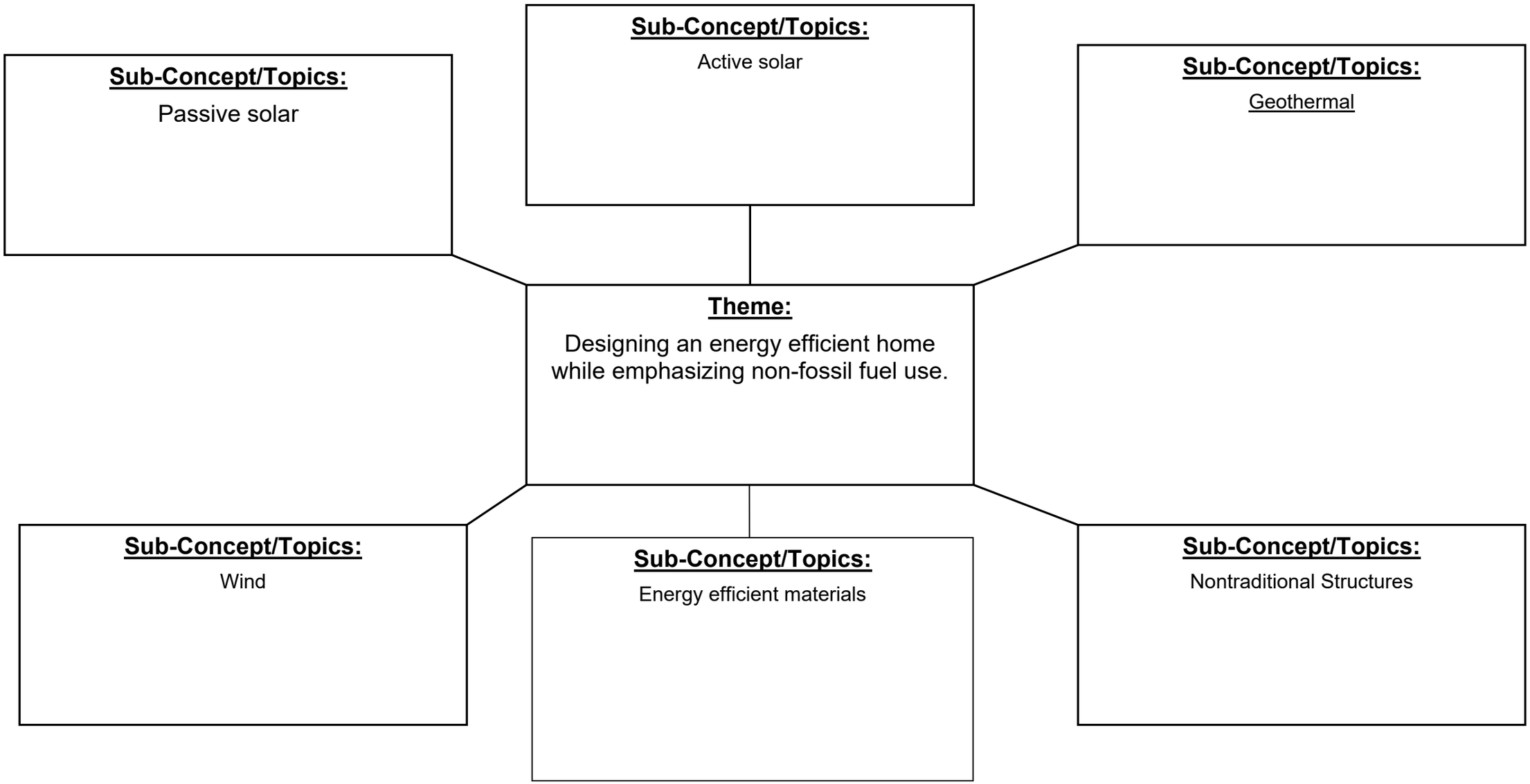
Unit #: **UNIT 8 OVERVIEW** **Unit Title:** Designing for Alternative Energy Application

Unit Description and Objectives:
Escalating energy costs along with the increasing difficulty in locating and extracting fossil fuels are making alternative energy sources more attractive.

Essential Questions and Enduring Understandings:

Essential Questions:	**Enduring Understandings/Generalizations Students will understand that:**	**Guiding Questions**
1. What is the primary consideration when a developer is laying out a subdivision?	1. The use of alternative energy sources in residential design and building is not governed by energy efficiency of the resultant subdivision.	1.1 Why wouldn't it always be better to incorporate energy efficiency into an entire subdivision of homes? 1.2 What other factors need to be considered for the design of homes that don't rely on fossil fuels? 1.3 What are some drawbacks in using solar energy? Wind? Geothermal?
2. Why doesn't every building use geothermal energy?	2. Not all regions of the earth are suited for the application of geothermal design.	2.1 Would it be practical to use geothermal energy in New Jersey? 2.2 What do prime geothermal locations have in common?
3. What part of the country is most suited for wind power?	3. There are some areas of the earth that are not suitable for the application of wind energy.	3.1 What would prevent a wind turbine generating station from being placed in an urban area? Suburban area? 3.2 What areas of the US would be ideal for wind energy harvesting?
4. Is it necessary to have solar panels installed to take advantage of solar heating?	4. Passive solar design does not require any additional devices to take advantage of solar heat.	4.1 What feature can a house have designed into it to take advantage of solar gain?
5. What distinguishes active from passive solar?	5. Passive solar heating involves capturing, storing, and using solar radiation without the use of fans or pumps to circulate the heat.	5.1 How does passive solar gain distribute heat?

UNIT GRAPHIC ORGANIZER



CURRICULUM UNIT PLAN

Course Title/Grade: Architectural Design Systems

Unit Number/Title: 8 Designing for Alternative Energy Application

Conceptual Lens: Energy efficiency can be designed as part of the home from its inception

Appropriate Time Allocation (# of Days): 37

Primary Content Standards referenced With Cumulative Progress Indicators			
8.2.12.A.1	8.2.12.B.1	8.2.12.B.2	8.2.12.D.1
8.2.12.E.1	8.2.12.F.1	8.2.12.F.2	8.2.12.F.3
8.2.12.G.1	9.3.12.AC.1	9.3.12.AC.2	9.3.12.AC.6

Topics/Concepts (Incl. time / # days per topic)	Critical Content (Students Will Know :)	Skill Objectives (Students Will Be Able To :)	Instructional/Learning Activities & Interdisciplinary Connections	Instructional Resources	Technology & 21st C Skills Integration (Specify)	NJSLS w/ CPI Reference	Evaluation/ Assessment:
1) Solar a.) Passive i) Direct gain ii) Indirect gain iii) Isolated gain b) Active i) Warm Air ii) Warm Water 2) Wind 3) Geothermal 4) Nontraditional Structures a. Earth sheltered b. Dome structures 5) Contemporary building materials Materials a. Exterior Insulation Finish	1) Some of the considerations t o be made when designing for nontraditional house design 2) The difference between active and passive solar 3) The pros and cons of geothermal and wind power use 4) The calculation procedure	1) Design and model a structure that is energy efficient 2) Design a structure for passive and active solar applications 3) Calculate the heating requirements for a residential structure that will use geothermal energy for heating and cooling 4) Layout a site plan that takes into consideration the use of wind power 5) Apply the concepts of	1) Given a site plan with longitude and latitude students design a residential structure for that specific climate using a nontraditional structure type while taking into account passive, active, geothermal and wind power.	1) Internet 2) Revit software 3) Site plans and latitudes and longitudes of various locales throughout the U.S.	**P21Framework** 1. Creativity And Innovation 2. Critical Thinking And Problem Solving 3. Communication And Collaboration 4. Information Literacy 5. Ict (Information, Communications And Technology) Literacy 6. Initiative And Self-Direction 7. Productivity And Accountability **ISTE Standards**	8.2.12.A.1 8.2.12.B.1 8.2.12.B.2 8.2.12.D.1 8.2.12.E.1 8.2.12.F.1 8.2.12.F.2 8.2.12.F.3 8.2.12.G.1 9.3.12.AC.1 9.3.12.AC.2 9.3.12.AC.6 NJSLS.ELA-LITERACY.RST.11-12.1 NJSLS.ELA-LITERACY.RST.11-12.2 NJSLS.ELA-LITERACY.RST.11-12.3 NJSLS.ELA-LITERACY.RST.11-12.4 NJSLS.ELA-LITERACY.RST.11-12.5 NJSLS.MATH.CONTENT.HSF.TF.B.7 NJSLS.MATH.CONTENT.HSG.GMD.B.4	**Formative Assessments:** 1) Students debate passive vs. active solar 2) Students describe conditions in the U.S. that are conducive to geothermal applications 3) Students present site data for a given longitude and latitude **Summative Assessment(s)** 1) Students

Topics/Concepts (Incl. time / # days per topic)	**Critical Content (Students Will Know :)**	**Skill Objectives (Students Will Be Able To :)**	**Instructional/Learning Activities & Interdisciplinary Connections**	**Instructional Resources**	**Technology & 21st C Skills Integration (Specify)**	**NJSLS w/ CPI Reference**	**Evaluation/ Assessment:**
Systems b. Structural foam sandwich panels c. Concrete wall systems d. Synthetic materials e. Hebel wall system	for total solar radiation available in BTU's 5) Some of the alternative materials available	earth sheltered structures to a given site plan 6) List the advantages and disadvantages of a dome structure			1. Creativity and innovation 2. Communication and collaboration 3. Research and information fluency 4. Critical thinking, problem solving, and decision making		design a house using contemporary building materials for a given latitude and longitude that includes: 2) Both passive and active solar systems 3) Use of geothermal power where applicable

CROSS-CONTENT STANDARDS ANALYSIS

Course Title: Advanced Design Applications in Engineering **Grade:** 11-12

Unit Title:	Visual and Performing Arts	Comp. Health & Physical Ed.	English Language Arts	Mathematics	Science	Social Studies	World Languages	Technology	21st Century Life & Careers
I. Introduction to Course, Lab and Safety			NJSLS: Gr.11-12, RST 1 NJSLS: Gr.11-12, RST 3 NJSLS: Gr.11-12, RST 4 NJSLS: Gr.11-12, RST 8 NJSLS: Gr.11-12, RST 10 NJSLS: Gr.11-12, WHST 6 NJSLS: Gr.11-12, WHST 10	NJSLS N-Q.1-3				8.1.12.A3,4 8.1.12.D.5 8.1.12.E.1 8.1.12.F.12 8.2.12.B.4 8.2.12.C.5 9.1.12.A.3 9.1.12.A.6 9.2.12.C.3,6 9.3.12FN-ACT.1-4 CRP1-12 9.3.12.AC.4 9.3.12.AC.5 9.3.12.AC.7	
II. Architectural Design Fundamentals			NJSLS: Gr.11-12, RST 1 NJSLS: Gr.11-12, RST 3 NJSLS: Gr.11-12, RST 4 NJSLS: Gr.11-12, RST 8 NJSLS: Gr.11-12, RST 10 NJSLS: Gr.11-12, WHST 6 NJSLS: Gr.11-12, WHST 10	NJSLS N-Q.1-3				8.1.12.A3,4 8.1.12.D.5 8.1.12.E.1 8.1.12.F.12 9.1.12.A.3 9.1.12.A.6 9.2.12.C.3,6 9.3.12FN-ACT.1-4 CRP1-12	

III. Room and Space Planning			NJSLS: Gr.11-12, RST 1 NJSLS: Gr.11-12, RST 3 NJSLS: Gr.11-12, RST 4 NJSLS: Gr.11-12, RST 8 NJSLS: Gr.11-12, RST 10 NJSLS: Gr.11-12, WHST 6 NJSLS: Gr.11-12, WHST 10	NJSLS N-Q.1-3	HS-ETS1-1 HS-ETS1-2 HS-ETS1-3 HS-ETS1-4			8.1.12.A3,4 8.1.12.D.5 8.1.12.E.1 8.1.12.F.12 9.1.12.A.3 9.1.12.A.6 9.2.12.C.3,6 9.3.12FN-ACT.1-4 CRP1-12	
IV. Plot Plans and Foundations			NJSLS: Gr.11-12, RST 1 NJSLS: Gr.11-12, RST 3 NJSLS: Gr.11-12, RST 4 NJSLS: Gr.11-12, RST 8 NJSLS: Gr.11-12, RST 10 NJSLS: Gr.11-12, WHST 1.a NJSLS: Gr.11-12, WHST 1.c NJSLS: Gr.11-12, WHST 6 NJSLS: Gr.11-12, WHST 10	NJSLS N-Q.1-3	HS-ETS1-1 HS-ETS1-2 HS-ETS1-3 HS-ETS1-4			8.1.12.A3,4 8.1.12.D.5 8.1.12.E.1 8.1.12.F.12 9.1.12.A.3 9.1.12.A.6 9.2.12.C.3,6 9.3.12FN-ACT.1-4 CRP1-12	P21Framework 1. Creativity And Innovation 2. Critical Thinking And Problem Solving 3. Communication And Collaboration 4. Information Literacy 5. Ict (Information, Communications And Technology) Literacy 6. Initiative And Self-Direction 7. Productivity And Accountability 8. ISTE Standards 9. Creativity and innovation 10. Communication and collaboration 11. Research and information fluency 12. Critical thinking, problem solving, and decision making
V. Formulating a Design			NJSLS: Gr.11-12, RST 1 NJSLS: Gr.11-12, RST 3 NJSLS: Gr.11-12, RST 4 NJSLS: Gr.11-12, RST 8 NJSLS: Gr.11-12, RST 10 NJSLS: Gr.11-12, WHST 6 NJSLS: Gr.11-12, WHST 10	NJSLS N-Q.1-3	HS-ETS1-1 HS-ETS1-2 HS-ETS1-3 HS-ETS1-4			8.1.12.A3,4 8.1.12.D.5 8.1.12.E.1 8.1.12.F.12 9.1.12.A.3 9.1.12.A.6 9.2.12.C.3,6 9.3.12FN-	P21Framework 1. Creativity And Innovation 2. Critical Thinking And Problem Solving 3. Communication And Collaboration

								ACT.1-4 CRP1-12	4. Information Literacy 5. Ict (Information, Communications And Technology) Literacy 6. Initiative And Self-Direction 7. Productivity And Accountability 8. ISTE Standards 9. Creativity and innovation 10. Communication and collaboration 11. Research and information fluency 12. Critical thinking, problem solving, and decision making
VI. Construction Systems			NJSLS: Gr.11-12, RST 1 NJSLS: Gr.11-12, RST 3 NJSLS: Gr.11-12, RST 4 NJSLS: Gr.11-12, RST 8 NJSLS: Gr.11-12, RST 10 NJSLS: Gr.11-12, WHST 1.a NJSLS: Gr.11-12, WHST 1.c NJSLS: Gr.11-12, WHST 6 NJSLS: Gr.11-12, WHST 10	NJSLS N-Q.1-3	HS-ETS1-1 HS-ETS1-2 HS-ETS1-3 HS-ETS1-4			8.1.12.A3,4 8.1.12.D.5 8.1.12.E.1 8.1.12.F.12 9.1.12.A.3 9.1.12.A.6 9.2.12.C.3,6 9.3.12FN-ACT.1-4 CRP1-12	P21Framework 1. Creativity And Innovation 2. Critical Thinking And Problem Solving 3. Communication And Collaboration 4. Information Literacy 5. Ict (Information, Communications And Technology) Literacy 6. Initiative And Self-Direction 7. Productivity And Accountability 8. ISTE Standards 9. Creativity and innovation 10. Communication and collaboration 11. Research and information fluency 12. Critical thinking, problem solving, and decision

									making
VII. Electrical, Plumbing and Mechanical Systems			NJSLS: Gr.11-12, RST 1 NJSLS: Gr.11-12, RST 3 NJSLS: Gr.11-12, RST 4 NJSLS: Gr.11-12, RST 8 NJSLS: Gr.11-12, RST 10 NJSLS: Gr.11-12, WHST 6 NJSLS: Gr.11-12, WHST 10	NJSLS N-Q.1-3	HS-ETS1-1 HS-ETS1-2 HS-ETS1-3 HS-ETS1-4			8.1.12.A3,4 8.1.12.D.5 8.1.12.E.1 8.1.12.F.12 9.1.12.A.3 9.1.12.A.6 9.2.12.C.3,6 9.3.12FN-ACT.1-4 CRP1-12	P21Framework 1. Creativity And Innovation 2. Critical Thinking And Problem Solving 3. Communication And Collaboration 4. Information Literacy 5. Ict (Information, Communications And Technology) Literacy 6. Initiative And Self-Direction 7. Productivity And Accountability 8. ISTE Standards 9. Creativity and innovation 10. Communication and collaboration 11. Research and information fluency 12. Critical thinking, problem solving, and decision making
VIII. Designing for Alternative Energy Application			NJSLS: Gr.11-12, RST 1 NJSLS: Gr.11-12, RST 3 NJSLS: Gr.11-12, RST 4 NJSLS: Gr.11-12, RST 8 NJSLS: Gr.11-12, RST 10 NJSLS: Gr.11-12, WHST 6 NJSLS: Gr.11-12, WHST 10	NJSLS N-Q.1-3	HS-ETS1-1 HS-ETS1-2 HS-ETS1-3 HS-ETS1-4			8.1.12.A3,4 8.1.12.D.5 8.1.12.E.1 8.1.12.F.12 9.1.12.A.3 9.1.12.A.6 9.2.12.C.3,6 9.3.12FN-ACT.1-4 CRP1-12	P21Framework 1. Creativity And Innovation 2. Critical Thinking And Problem Solving 3. Communication And Collaboration 4. Information Literacy 5. Ict (Information, Communications And Technology) Literacy 6. Initiative And Self-Direction 7. Productivity And

									Accountability 8. ISTE Standards 9. Creativity and innovation 10. Communication and collaboration 11. Research and information fluency 12. Critical thinking, problem solving, and decision making

***All content areas may not be applicable in a particular course.**

Unit Modifications for Special Population Students:

Struggling Learners	Gifted and Talented Students (Challenge Activities)	English Language Learners	Learners with an IEP	Learners with a 504
1. Students are partnered with another student to help with BIM concepts	1. Students use redesign their house to incorporate rammed earth concepts.	1. use on-line translation as needed	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines	• Refer to page four in the Parent and Educator Guide to Section 504 to assist in the development of appropriate plans.
2. Teacher groups students according to ability to allow gifted students to assist struggling students with use of Revit software.	2. Students design a residence to be completely off grid.	2. Work with ELL teacher to develop strategy to allow ELL students to have success.		
3. Teacher is available for after school help	3. Students develop a presentation that describes how a photovoltaic array works.			

			offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org	

CURRICULUM MODIFICATION

The regular curriculum is modified for Special Education students enrolled in both self-contained and resource center classes.

Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include:

- Variation of time: adapting the time allotted for learning, task completion, or testing
- Variation of input: adapting the way instruction is delivered
- Variation of output: adapting how a student can respond to instruction
- Variation of size: adapting the number of items the student is expected to complete
- Modifying the content, process or product

Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here.

Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org