



**Program Name:** Design and Engineering

**Program topic:** Through exploring and considering Vizcaya's unique design, students are immersed in concepts of architecture, engineering, geometry, spatial organization, mathematical thinking and are able to apply and understand concepts proper of physics such as gravity and balance. Students will learn about Vizcaya's history with focus on its construction, identify patterns in the design of the natural and the built environment, reflect and test the architectural principles of a structure like Vizcaya, and apply the concepts learned through model building.

**Program Essential Question:** What can we learn about geometry, symmetry, engineering, and design from Vizcaya's unique architecture?

**Location:** Main House and Gardens

**Grade Levels:** 2<sup>nd</sup>-5<sup>th</sup> grades

**Understandings:**

- Students will understand the purpose of Vizcaya has changed over time (private home to public museum).
- Students will understand that Vizcaya was a unique project 100 years due to its location, complexity, size and methods.
- Students will understand the concept of symmetry.
- Students will understand that geometry is the foundation of architectural design.
- Students will understand that various architectural and design elements are put together to create a structure.
- Students will understand that arrangement of architectural and design elements can affect the endurance of a structure.

**Essential Questions:**

- Why was Vizcaya's construction unique?
- What role does symmetry and pattern play in Vizcaya's architectural design?
- What are the different ways that we can place geometric shapes to find balance?
- What is the best arrangement of architectural and design elements to create an enduring structure?

**Knowledge:**

- Students will know that Vizcaya was and is unique in its design.
- Students will know how to find mirror symmetry at Vizcaya.
- Students will know how to identify select 2D geometric figures.
- Students will know how to draw select 2D geometric figures.
- Students will know that various 3D geometric shapes have surfaces on which they are more stable.

## Field Study: Design and Engineering

### Skills:

- Students will identify and consider multiple possibilities to reflect on the essential question.
- Make connections between the past and present.
- Compare and contrast images, objects, experiences and ideas.
- Students will use active communication to collaborate with peers to accomplish hands-on tasks.
- Students will participate in hands-on activities and sensory learning through immersive experiences.

### Instructional Strategies:

- Object and image-based discussions during school program and classroom pre-visit material provided by Vizcaya.
- Inquiry-based facilitated discussions during school program and classroom pre-visit material provided by Vizcaya.
- Image-based discussions using archival resources during school program.

### Note to Educators:

- The school program will take place rain or shine. Comfortable shoes and casual clothes are suggested.
- All school program facilitators are specifically trained and certified by Vizcaya Museum and Gardens to work with school audiences.
- During the school program students will have the opportunity to consider many different kinds of questions, and we welcome many responses. We do this to encourage thinking skills. We ask that you allow students time to consider and to respond to these questions.
- School programs often include the use of new vocabulary, carefully selected to support the program's curricular goals. During the school program students will have the opportunity to hear new vocabulary and to work as a group to consider meaning. This is an opportunity for students to use context clues to understand unique and unfamiliar terminology. We ask that you allow students time to puzzle through new vocabulary, as facilitated by the program facilitator.
- This school program may include a reproduction of archival resources and/or quotes regarding the history of Vizcaya. During the school program students may have the opportunity to read independently and aloud. As archival and historical resources they may be difficult to decipher or contain unfamiliar vocabulary—and this is the point. This is an opportunity for students to use context clues to read and understand unique and unfamiliar documents. We ask that you allow students time to puzzle through their reading, as facilitated by the program facilitator.
- The above experiences allow educators the opportunity to observe their students and to consider how learning in the school classroom is applied and expanded upon in a new learning environment.

**Florida State Educational Standards for School Program**

**2<sup>nd</sup> Grade**

SC.2.N.1.2  
SC.2.N.1.3  
SC.2.N.1.6  
MAFS.2.G.1.1  
MAFS.2.G.1.2  
MAFS.K12.MP.1.1  
MAFS.K12.MP.2.1  
MAFS.K12.MP.4.1  
MAFS.K12.MP.5.1  
MAFS.K12.MP.6.1  
MAFS.K12.MP.7.1  
SS.2.A.1.1  
VA.2.C.3.2  
VA.2.H.3.1  
LAFS.2.L.1.1  
LAFS.2.L.2.3

**3<sup>rd</sup> Grade**

SC.3.E.5.4  
SC.3.N.1.6  
SC.3.N.3.2  
SC.3.P.8.3  
SC.35.CS-CS.1.1  
SC.35.CS-CS.1.2  
SC.35.CS-CS.1.3  
SC.35.CS-CS.1.4  
SS.3.A.1.1  
VA.3.C.3.3  
VA.3.H.3.1  
MAFS.3.G.1.1

MAFS.K12.MP.2.1  
MAFS.K12.MP.4.1  
MAFS.K12.MP.5.1  
MAFS.K12.MP.6.1  
MAFS.K12.MP.7.1  
LAFS.3.L.1.1  
LAFS.3.L.2.3  
LAFS.3.SL.1.1  
LAFS.3.SL.1.3  
LAFS.3.SL.2.6

**4<sup>th</sup> Grade**

SC.4.N.1.1  
SC.4.N.1.2  
SC.4.N.1.5  
SC.4.N.1.8  
SC.4.N.3.1  
SC.4.P.8.1  
SC.35.CS-CS.1.2  
SC.35.CS-CS.1.3  
SC.35.CS-CS.2.2  
SC.35.CS-CS.2.4  
SS.4.A.1.2  
SS.4.A.6.3  
SS.4.FL.1.1  
VA.4.C.3.2  
VA.4.F.2.1  
VA.4.H.1.2  
VA.4.H.2.2  
MAFS.4.G.1.2  
MAFS.4.G.1.3

MAFS.K12.MP.1.1  
MAFS.K12.MP.2.1  
MAFS.K12.MP.4.1  
MAFS.K12.MP.5.1  
MAFS.K12.MP.6.1  
MAFS.K12.MP.7.1  
LAFS.4.L.1.1  
LAFS.4.L.2.3  
LAFS.4.SL.1.1  
LAFS.4.SL.1.3

**5<sup>th</sup> Grade**

SC.5.N.1.3  
SC.5.N.1.6  
SC.35.CS-CS.1.2  
SC.35.CS-CS.1.3  
SC.35.CS-CS.2.4  
VA.5.F.2.2  
VA.5.H.2.2  
MAFS.K12.MP.1.1  
MAFS.K12.MP.2.1  
MAFS.K12.MP.4.1  
MAFS.K12.MP.5.1  
MAFS.K12.MP.6.1  
MAFS.K12.MP.7.1  
LAFS.5.L.1.1  
LAFS.5.L.2.3  
LAFS.5.SL.1.1  
LAFS.5.SL.1.3 -

**Lesson Plan Format Based On: Understanding by Design**

Wiggins, G. and McTighe, J. (2005). Understanding by design. Alexandria, VA: Association for Supervision and Curriculum Development.