

# VR Development pathway



## Syllabus

### What is the VR Development pathway?

This learning pathway is designed for anyone interested in learning to create experiences for VR. This pathway assumes a basic knowledge of Unity and basic knowledge of programming.

### Key details of the pathway

- A 45-70 hour learning journey that teaches VR application and games development with Unity.
- The Unity **VR Development** pathway covers everything needed to develop your skills in VR basics: events and interactions, ergonomics and optimization, and custom VR development.
- By the end of this pathway, learners will have created at least one virtual reality project and be empowered to create interactive experiences.



### What is the scope of this document?

This is a comprehensive syllabus overview that includes suggestions and guidance for educators to assist in the delivery of the Unity Virtual Reality Development pathway in their classroom or training center.

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## Skills

The following skills are covered in this pathway:

<b>Beginner VR Development</b>	<ul style="list-style-type: none"><li>• Program custom VR interactions in order to meet the requirements in a project brief.</li><li>• Optimize the performance of an app in order to meet headset framerate requirements.</li></ul>
<b>Beginner VR Development</b>	<ul style="list-style-type: none"><li>• Deploy VR projects to Unity-supported head-mounted displays (HMDs).</li><li>• Develop a VR app that demonstrates common interactions using Unity's XR interaction toolkit.</li></ul>

## Beginner VR Design

- Evaluate a proposed VR experience in order to suggest ways it could be improved.
- Decide which XR hardware to target, given the goals of a particular project.

## Duration

<b>Independently</b>	If completed independently, the course can take 30-45 hours
<b>In a classroom</b>	If completed with students in a classroom, the course can take 55-70 hours

## Teaching approaches and contexts

### Who are your learners?

The **VR Development** pathway is primarily for people who already have experience programming with Unity and want to apply those skills to VR.

If you want to create simpler VR experiences that do not use any custom code, you can take the [Create with VR](#) course. It does not require any programming knowledge.

If you want to work in VR development but don't have any programming skills, we recommend that you complete the [Junior Programmer](#) pathway first or alongside this pathway. The Junior Programmer pathway will give you the fundamentals of programming required to complete this course.

If you are unsure whether your programming skills are strong enough to complete this pathway, you can take [this pre-assessment quiz](#). We will ask you to take this quiz later in the pathway before the tutorials where programming is required.

The **VR Development** pathway incorporates different types of content that give you a thorough introduction to each domain, as well as opportunities to bring those domains together in larger projects.

In the core missions, you will learn the core skills in each creative domain, as well as critical, less technical creator skills.

In the guided projects and challenges, you will apply your new skills to a project that we provide while following a design document.

In the independent project, you will apply your skills at the end of the pathway to a project that you design.

## Instructor/facilitator guidance

As an instructor/facilitator for a learning experience based around the Virtual Reality Development pathway, your most valuable contributions are likely to be the following:

- Modeling techniques and basic creation in Unity (this is especially the case for less technically literate cohorts).
- Facilitating discussion and exploration of creator skills and workplace industries.
- Questioning to consolidate and deepen understanding.
- Troubleshooting learner technical issues.

The following table offers some guidance on adapting this learning experience for your teaching approaches and circumstances.

<b>Flipped classroom / instruction</b>	Pre-class work can be assigned by tutorial or mission within the Unity Virtual Reality Development pathway.
<b>Project-based</b>	The Unity Virtual Reality Development pathway is a project-based course.
<b>Inquiry-based</b>	The Unity Virtual Reality Development pathway covers software fundamentals, and so has not been designed with inquiry-based learning as a priority. However, the VR software career and XR industry information within the pathway could provide the foundation for identifying research questions for further inquiry-based/research-based learning that meets the particular needs of your group.
<b>Independent learning</b>	The Unity Virtual Reality Development pathway is designed in such a way that learners can choose to study independently, with optional checkpoints from the educator. The content is complete and is presented in a mix of video and text, with all the required resources linked in each tutorial.

## Self-paced learning time estimates

To assist you in planning your delivery of the pathway, we have provided this table to illustrate the estimated time needed for each section and unit.

## Mission 1: [VR basics](#)

Tutorial	Time (suggested)	
	Minimum	Maximum
<a href="#">Welcome to the Pathway</a>	35 minutes	1 hour
<a href="#">VR Software Setup</a>	1 hour	1 hour 30 minutes
<a href="#">1.1 - VR Project Setup</a>	1 hour 30 minutes	2 hours 15 minutes
<a href="#">1.2 - VR Locomotion</a>	1 hour 30 minutes	2 hours 15 minutes
<a href="#">1.3 - Grabbable Objects</a>	1 hour 30 minutes	2 hours 15 minutes
<a href="#">1.4 - Sockets</a>	1 hour 30 minutes	2 hours 15 minutes
<a href="#">Challenge 1 - Architecture Review</a>	1 hour	1 hour 30 minutes
<a href="#">The VR software landscape</a>	20 minutes	30 minutes
<a href="#">Lab 1 - VR Personal Project Basics</a>	2 hours	3 hours
<a href="#">Submission 1 - Share your Work</a>	10 minutes	15 minutes
<a href="#">Mission 1 Quiz - VR Basics</a>	15 minutes	22 minutes

## Mission 2: [Events and Interactions](#)

Tutorial	Time (suggested)	
	Minimum	Maximum
<a href="#">2.1 - Audio and Haptics</a>	1 hour 30 minutes	2 hour 15 minutes
<a href="#">2.2 - Activation Events</a>	1 hour 30 minutes	2 hour 15 minutes
<a href="#">2.3 - Direct and Ray Interactors</a>	1 hour 30 minutes	2 hour 15 minutes
<a href="#">2.4 - User Interface</a>	1 hour 30 minutes	2 hour 15 minutes

<a href="#">Challenge 2 - 3D Painting</a>	1 Hour	1 hour 30 minutes
<a href="#">The XR hardware landscape</a>	20 minutes	30 minutes
<a href="#">Lab 2 - Personal Project Events &amp; Interactions</a>	2 hours	3 hours
<a href="#">Submission 2 - Share your Work</a>	10 minutes	15 minutes
<a href="#">Mission 2 Quiz - VR Events &amp; Interaction</a>	15 minutes	20 minutes

### Mission 3: [Ergonomics and Optimization](#)

Tutorial	Time (suggested)	
	Minimum	Maximum
<a href="#">3.1 - Comfort and Accessibility</a>	1 hour 30 minutes	2 hour 15 minutes
<a href="#">3.2 - Optimization</a>	1 hour 30 minutes	2 hour 15 minutes
<a href="#">3.3 - Lighting</a>	1 hour 30 minutes	2 hour 15 minutes
<a href="#">3.4 - Building and Sharing</a>	1 hour 30 Minutes	2 hour 15 minutes
<a href="#">Challenge 3 - Training Simulation</a>	1 hour	1 hour 30 minutes
<a href="#">Keeping up with XR technology</a>	20 minutes	30 minutes
<a href="#">Lab 3 - Personal Project Ergonomics &amp; Optimization</a>	2 hours	3 hours
<a href="#">Submission 3 - Share your Work</a>	10 minutes	15 minutes
<a href="#">Mission 3 Quiz - VR Ergonomics &amp; Optimization</a>	15 minutes	20 minutes

### Mission 4: [Custom VR Development](#)

Tutorial	Time (suggested)	
	Minimum	Maximum
<a href="#">What is in this mission?</a>	10 minutes	15 minutes

<a href="#">Project 1: XRI Template walkthrough</a>	3 hours 30 minutes	5 hour 15 minutes
<a href="#">Project 2: Escape Room Project brief</a>	5 hours 10 minutes	7 hours 45 minutes
<a href="#">Project 3: Clone with a twist!</a>	3 hours	4 hour 30 minutes
<a href="#">Submit your final project</a>	1 hour	1 hour 30 minutes

# Course outline

## [Mission 1: VR Basics](#)

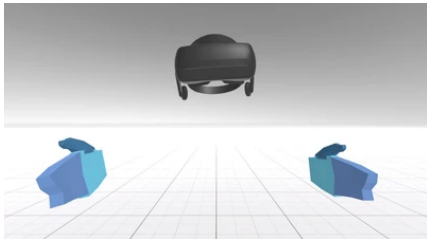

In this mission, you will learn the basics of setting up a VR project and implementing simple interactivity.

In these tutorials, you will do the following:

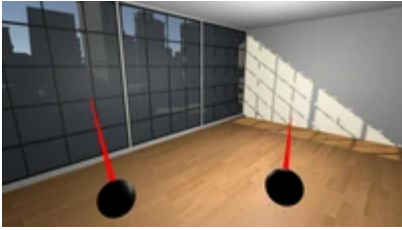

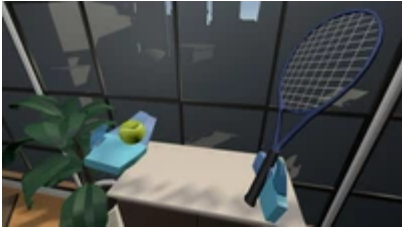
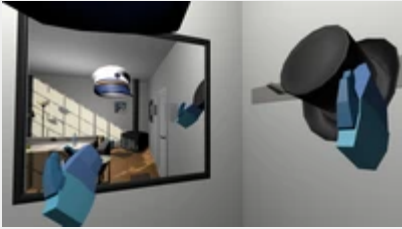

- Set up a VR-ready project with the room of your choice
- Implement locomotion so that users can move around the scene
- Add grabbable objects users can pick up and throw around
- Set up sockets that objects can snap into
- Learn about the VR software landscape







In the Challenge for this mission, you will apply your skills in an architectural review prototype. Then, in the Lab, you'll fill out a design document to lay out a concept for your own project, and then begin working on it. Finally, in the Quiz, you will test your new knowledge.

1	<a href="#">Welcome to the Pathway</a> 	Virtual reality (VR) is a fast-growing, exciting field with a lot of career opportunities in related disciplines. In this first tutorial, you will learn all about the <b>VR Development</b> pathway, a guided learning experience that prepares you for work in VR development.
2	<a href="#">VR Software Setup</a> 	In this lesson, you will get all the necessary software for your computer and your VR device installed and configured for VR development. If you haven't already, you should install the recommended version of Unity to be able to follow along with this course. Depending on which VR device you intend to use, you may also need to install additional export modules. You will also make sure that your VR headset is configured properly for development and testing, including downloading any additional device-specific software that is required.
3	<a href="#">1.1 - VR Project Setup</a>	By the end of this lesson, you will have a new unity project with a big empty room that you will experience in VR.



		
4	<p><a href="#">1.2 - VR Locomotion</a></p> 	<p>In this lesson, you will learn how to implement various types of locomotion in VR. By the end of this lesson, the user will be able to teleport around your newly furnished room to admire it from all angles.</p>
5	<p><a href="#">1.3 - Grabbable Objects</a></p> 	<p>In this lesson, you will learn how to configure objects for basic grabbable interactivity in VR. By the end of this lesson, users will be able to pick up objects in the scene and throw them around.</p>
6	<p><a href="#">1.4 - Sockets</a></p> 	<p>In this lesson, you will learn how to configure sockets that objects can snap into in VR. By the end of this lesson, users will be able to hang hats up on hooks - and even wear the hats too!</p>
7	<p><a href="#">Challenge 1 - Architecture Review</a></p> 	<p>In this challenge, you'll apply the skills you learned while making your VR room in an architecture review app. In this prototype, the user can examine a building at real-world scale, inspect a miniature 3d model and floor plan of that building, and even use a ruler to take measurements as they look around.</p> <p>This challenge will assess skills learned in the following lessons:</p> <ul style="list-style-type: none"> <li>• <a href="#">VR locomotion</a></li> <li>• <a href="#">Grabbable objects</a></li> <li>• <a href="#">Sockets</a></li> </ul>

8	<p><a href="#">The VR software landscape</a></p> 	<p>If you're not an active user of a particular medium, you'll have difficulty designing effective experiences for that medium. You're much better positioned to create comfortable, intuitive experiences when you are very familiar with the medium you're designing for.</p> <p>In this tutorial, you will do the following things:</p> <ul style="list-style-type: none"> <li>• Familiarize yourself with a wide range of typical VR experiences.</li> <li>• Learn about the advantages and disadvantages of VR, compared to traditional screen-based experiences.</li> <li>• Learn what makes for effective VR experiences.</li> </ul>
9	<p><a href="#">Lab 1 - VR Personal Project Basics</a></p> 	<p>In this first lab, you'll fill out a design document to lay out your concept, and then set up a basic VR scene using simple primitive shapes.</p> <p>This lab will draw on skills learned in the following lessons:</p> <ul style="list-style-type: none"> <li>• <a href="#">VR Project Setup</a></li> <li>• <a href="#">VR Locomotion</a></li> <li>• <a href="#">Grabbable Objects</a></li> <li>• <a href="#">Sockets</a></li> </ul>
10	<p><a href="#">Submission 1 - Share your Work</a></p> 	<p>If you went above and beyond in your VR room, the challenge, or your personal project for this Unit, please share screenshots or videos.</p>
11	<p><a href="#">Mission 1 Quiz - VR Basics</a></p> 	<p>In this quiz, you will test the knowledge and skills you learned in Mission 1 related to VR Basics.</p>

## Mission 2: Events and Interactions

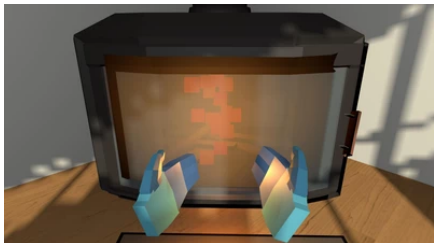


In this mission, you will implement more complex interactions in VR-based applications to make the experience more immersive.




In these tutorials, you will do the following:




- Implement audio and haptic feedback.
- Apply new functionality to specific objects.
- Allow the user to toggle between multiple types of interactors.
- Add user interfaces to the world.
- Learn about the XR hardware landscape.



In the Challenge for this mission, you will apply your skills in a 3D painting prototype. Then, in the Lab, you'll implement the core functionality of your personal project. Finally, in the Quiz, you will test your new knowledge.

1	<p><a href="#"><u>2.1 - Audio and Haptics</u></a></p> 	<p>In this lesson, you will learn how to increase the immersion of your project through touch and audio stimuli. By the end of this lesson, the user will receive haptic and auditory feedback when they hover over or grab an object. There will also be 3D spatial ambient sound in the scene.</p>
2	<p><a href="#"><u>2.2 - Activation Events</u></a></p> 	<p>In this lesson, you will learn how to add unique functionality to an object when the user interacts with it in a certain way. By the end of this lesson, users will be able to pick up a remote and press a button on a controller to turn on a TV.</p>
3	<p><a href="#"><u>2.3 - Direct and Ray Interactors</u></a></p> 	<p>In this lesson, you will learn how to implement Direct Interactors and how to switch between interactors on the same controller. By the end of this lesson, the user will be able to grab things directly with their hands, and then toggle a ray to point at things when they need to.</p>

4	<p><a href="#"><u>2.4 - User Interface</u></a></p> 	<p>In this lesson, you will learn how to implement world space user interfaces in VR. By the end of this lesson, the user will be greeted by a welcome screen that provides basic instructions. They will also be able to bring up a simple reset menu that allows them to reload the scene.</p>
5	<p><a href="#"><u>Challenge 2 - 3D Painting</u></a></p> 	<p>In this challenge, you'll apply the skills you learned while making your VR room in a 3D painting app. In this app, the user can choose the shape they want to paint on, select the color and size of their brush on a handheld palette, and then create their masterpiece!</p> <p>This challenge will review your skills learned in the following lessons:</p> <ul style="list-style-type: none"> <li>• <a href="#"><u>Audio and Haptics</u></a></li> <li>• <a href="#"><u>Activation Events</u></a></li> <li>• <a href="#"><u>Direct and Ray Interactors</u></a></li> <li>• <a href="#"><u>User Interface</u></a></li> </ul>
6	<p><a href="#"><u>The XR hardware landscape</u></a></p> 	<p>There are so many VR headsets out there that it can be overwhelming at first. If you are going to work in the world of VR development, it's important to get your bearings in this vast, rapidly-evolving hardware landscape.</p> <p>In this tutorial, you will do the following things:</p> <ul style="list-style-type: none"> <li>• Recall the difference between VR and other types of XR (such as AR and MR).</li> <li>• Learn the differences between the most widely used XR hardware systems.</li> <li>• Investigate the latest hardware trends in VR.</li> </ul>
7	<p><a href="#"><u>Lab 2 - Personal Project Events &amp; Interactions</u></a></p>	<p>By the end of this lab, your personal project will have most of its core functionality.</p> <p>This lab will draw on skills learned in the following lessons:</p> <ul style="list-style-type: none"> <li>• <a href="#"><u>Audio and Haptics</u></a></li> <li>• <a href="#"><u>Activation Events</u></a></li> <li>• <a href="#"><u>Direct and Ray Interactors</u></a></li> </ul>

		<ul style="list-style-type: none"> <li>• <a href="#">User Interface</a></li> </ul>
8	<p><a href="#">Submission 2 - Share your Work</a></p> 	<p>If you went above and beyond in your VR room, the challenge, or your personal project for this Unit, please share screenshots or videos!</p>
9	<p><a href="#">Mission 2 Quiz - VR Events &amp; Interaction</a></p> 	<p>In this quiz, you will test the knowledge and skills you learned in Mission 2 related to VR Events and Interactions. This quiz is part of the <b>VR Development</b> pathway.</p>

## Mission 3: Ergonomics and Optimization


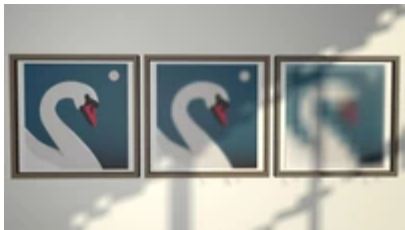

In this mission, you will focus on ergonomics and optimization for VR in order to make your app as accessible and comfortable as possible.

In these tutorials, you will do the following:




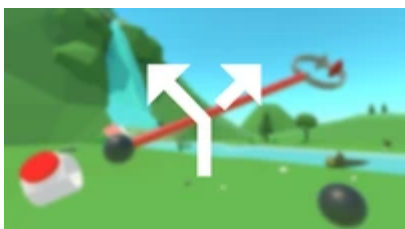
- Improve comfort and accessibility.
- Evaluate key performance metrics.
- Implement optimized baked lighting.
- Configure and build your app for sharing.
- Learn to keep up with XR tech changes.





In the Challenge for this mission, you will apply your skills in an industrial training simulation prototype. Then, in the Lab, you'll implement the core functionality of your personal project. Finally, in the Quiz, you will test your new knowledge.

1	<p><a href="#"><u>3.1 - Comfort and Accessibility</u></a></p> 	<p>In this lesson, you will learn how to reduce the risk of simulator sickness and increase the inclusivity of your app, allowing it to be enjoyed by as many people as possible. By the end of this lesson, your app will be more comfortable and accessible.</p>
2	<p><a href="#"><u>3.2 - Optimization</u></a></p> 	<p>In this lesson, you will learn about each of the key performance metrics for VR (fps, polycount, and draw calls) and how to ensure these metrics are optimized. By the end of this lesson, your app will be more optimized for performance.</p>
3	<p><a href="#"><u>3.3 - Lighting</u></a></p> 	<p>In this lesson, you will learn how to use light modes, lightmapping, and light probes in order to optimize the lighting for VR. By the end of this lesson, the lighting in your scene will be both beautiful and performant.</p>
4	<p><a href="#"><u>3.4 - Building and Sharing</u></a></p>	<p>In this lesson, you will follow guidelines for VR best practices</p>



		and explore options for sharing your work. By the end of this lesson, you'll configure your app appropriately and build a version of it that is ready to share.
5	<p><a href="#"><u>Challenge 3 - Training Simulation</u></a></p> 	<p>In this challenge, you'll apply the skills you learned while making your VR room in an industrial training simulation. In this app, using buttons, knobs, levers, and joysticks, the user has to collect crates dropped into the factory and stack them on a nearby platform.</p> <p>This challenge will assess skills learned in the following lessons:</p> <ul style="list-style-type: none"> <li>• <a href="#"><u>Comfort and Accessibility</u></a></li> <li>• <a href="#"><u>Optimization</u></a></li> <li>• <a href="#"><u>Lighting</u></a></li> </ul>
6	<p><a href="#"><u>Keeping up with XR technology</u></a></p> 	<p>The technology and trends in VR change at a rapid rate. In the time it takes you to complete this pathway, there will have probably been changes in the industry already!</p> <p>In this tutorial, you will learn the following things:</p> <ul style="list-style-type: none"> <li>• Why keeping up to date is important.</li> <li>• Tips and tricks for keeping up to date efficiently.</li> </ul>
7	<p><a href="#"><u>Lab 3 - Personal Project Ergonomics &amp; Optimization</u></a></p> 	<p>By the end of this lab, your personal project will be filled with beautiful art, optimized for performance and ready to share.</p> <p>This lab will draw on skills learned in the following lessons:</p> <ul style="list-style-type: none"> <li>• <a href="#"><u>Comfort and Accessibility</u></a></li> <li>• <a href="#"><u>Optimization</u></a></li> <li>• <a href="#"><u>Lighting</u></a></li> <li>• <a href="#"><u>Building and Sharing</u></a></li> </ul>
8	<p><a href="#"><u>Submission 3 - Share your Work</u></a></p>	<p>If you went above and beyond in your VR room, the challenge, or your personal project for this Unit, please share</p>

		screenshots or videos!
9	<p><a href="#"><u>Mission 3 Quiz - VR Ergonomics &amp; Optimization</u></a></p> 	In this quiz, you will test the knowledge and skills you learned in Mission 3 related to VR Lighting and Optimization. This quiz is part of the <b>VR Development</b> pathway.



## Mission 4: Custom VR Development

In the previous missions, you used pre-made interaction scripts provided to you as part of the Create with VR project. This mission will teach you to write scripts specifically for VR applications. You'll write these scripts from scratch in the context of three separate projects.

In project 1, the XRI example scene created by the XR Interaction Toolkit team, you'll reference existing code and documentation to program some more advanced, customized interactables.

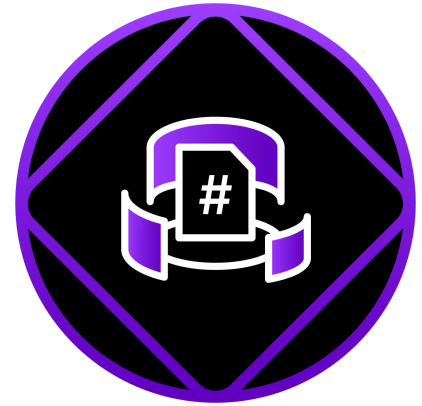
In project 2, you'll follow guidelines from a project brief to create part of a VR escape room. Rather than following step-by-step instructions here, you'll only receive hints.



In project 3, which you'll submit to receive your pathway badge, you'll create your own unique VR project. The challenge here is to create a clone with a twist: a version of an established VR experience, but with a unique alteration.



As mentioned in the [first tutorial of this pathway](#), you should already have a good foundational knowledge of scripting in the Unity engine to make the most out of this learning content.

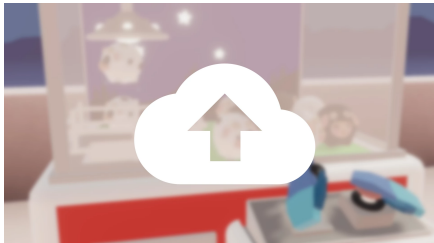
If you don't already have a foundational understanding of scripting, now is an excellent time to learn. We recommend you complete the [Junior Programmer pathway](#), and then return here.

If you feel almost ready but want to brush up on a few skills without doing the entire **Junior Programmer** pathway, why not check out the [Beginner Scripting](#) and [Intermediate Scripting](#) series.



1	<p><a href="#">What is in this mission?</a></p> 	<p>It's time to take your programming skills and apply them to create custom VR interactions.</p> <p>In this first tutorial of the mission, you will learn what to expect from this mission, including an overview of the three distinct projects you'll be working on.</p>
2	<p><a href="#">Project 1: XRI Template walkthrough</a></p> 	<p>In this project, you will explore and expand on the XRI template scene. In this scene, there are stations containing a variety of common VR interactions. These range from simple, grabbable objects to more intricate, comprehensive experiences like a claw machine game.</p> <p>Your task will be to make a new station in this scene with a couple of custom objects:</p> <ul style="list-style-type: none"><li>• A helpful scanner that displays other objects' information.</li></ul>

		<ul style="list-style-type: none"> <li>• A fun little balloon inflator object.</li> </ul> <p>In order to accomplish this, you will need to inspect the components of the existing objects in the scene and reference the online documentation. Since this is how most developers learn how to program new types of interactions, it will be perfect preparation for work in VR development.</p>
3	<p><a href="#">Project 2: Escape Room</a> <a href="#">Project brief</a></p> 	<p>In this project, you'll follow a project brief – just like you would in the industry – to create a part of an escape room. For this escape room, you'll be responsible for programming the final interactions of the experience.</p> <p>Specifically, the user should be able to do the following:</p> <ul style="list-style-type: none"> <li>• Enter a code on a number pad to receive a keycard.</li> <li>• Use that keycard to unlock a door.</li> <li>• Slide the door open to exit the room.</li> </ul> <p>Some of the code required for these interactions is complex, so you will have hints to guide you along the way. You will not have step-by-step instructions here; this experience is meant to simulate what it might be like to work as a VR developer.</p> <p><b>Project Objective</b></p> <p>By the end of this learning project you will be able to do the following:</p> <ul style="list-style-type: none"> <li>• Identify a high-level approach for programming a given feature in VR.</li> <li>• Extend the functionality of the default interactable and interactor objects.</li> <li>• Perform mathematical calculations on 3D vectors in order to program custom 3D interactions in VR.</li> <li>• Adhere to a VR project brief and implement required functionality.</li> </ul>
4	<p><a href="#">Project 3: Clone with a twist!</a></p> 	<p>You have reached the final tutorial of this pathway. Congratulations!</p> <p>As your final challenge, you'll apply what you've learned throughout the pathway to create one final project. Your task is to recreate (or clone) a familiar VR interaction or experience and add your own personal twist to it. This challenge will serve as a perfect portfolio piece for you,</p>

		<p>should you wish to get a job in the VR development industry.</p> <p>In this tutorial, you will learn what is required for this project and hear our established creators discuss what makes for a great portfolio piece.</p> <p>You will have an opportunity to actually submit this project and earn your pathway badge in the pathway checkpoint that follows this tutorial.</p>
5	<p><a href="#">Submit your final project</a></p> 	<p>In this final checkpoint, you will submit your Clone with a Twist project in order to earn your VR Development badge and complete the pathway.</p>

## Grading and rubrics

This pathway provides three avenues of assessment: quizzes, a guided project using provided assets, and an independent project. Beyond this, learners are also encouraged to create their own projects in parallel with the guided projects.

Assessment for this pathway can be done as follows:

- Challenges make up 30% of the final result | (3 Challenges x 10% each)
- Guided projects make up 30% of the final result | (3 Guided projects x 10% each)
- Quizzes make up 20% of the final result | (4 quizzes x 5% each)
- An independent project that makes up 20% of the final result

**Note:** These weight values are only suggestions.

## Challenges

<b>Weight</b>	30% (10 × 3% each)
<b>Description</b>	Students are given a project with missing or non-functional features and have to fix or create features to restore the project to a working condition.

<b>Purpose</b>	To give students an opportunity to apply the skills they have learned in a practical but controlled way.		
<b>4 - Excellent</b>	<b>3 - Good</b>	<b>2 - Fair</b>	<b>1 - Unsatisfactory</b>
<ul style="list-style-type: none"> <li>- All tasks from the challenge are completed.</li> <li>- All functionality is present and operating exactly as expected.</li> <li>- Project demonstrates a clear design sensibility and takes users into account.</li> <li>- Project achieves learning objective.</li> </ul>	<ul style="list-style-type: none"> <li>- Most tasks from the challenge are completed.</li> <li>- All functionality is present and operating mostly as expected.</li> <li>- Project takes users into account.</li> <li>- Project achieves learning objective.</li> </ul>	<ul style="list-style-type: none"> <li>- Some tasks from the challenge are completed.</li> <li>- Some functionality is missing and overall not operating as expected.</li> <li>- Project shows some evidence of taking users into account.</li> <li>- Project partially achieves learning objective.</li> </ul>	<ul style="list-style-type: none"> <li>- Barely any tasks from the challenge are completed.</li> <li>- Most functionality is absent.</li> <li>- Project does not demonstrate an awareness of the user</li> <li>- Project does not demonstrate goal or learning objective at all.</li> </ul>

## Guided project (Labs)

<b>Weight</b>	30% (10 × 3% each)		
<b>Description</b>	Students are guided through three phases of a project. In each mission, they will apply the skills and knowledge from that mission to this project phase in a guided fashion.		
<b>Purpose</b>	To give students an opportunity to apply the skills they have learned in a practical but controlled way.		
<b>4 - Excellent</b>	<b>3 - Good</b>	<b>2 - Fair</b>	<b>1 - Unsatisfactory</b>
<ul style="list-style-type: none"> <li>- All tasks from the module are completed.</li> <li>- All functionality is present and operating exactly as expected.</li> <li>- Project demonstrates a clear design</li> </ul>	<ul style="list-style-type: none"> <li>- Most tasks from the module are completed.</li> <li>- All functionality is present and operating mostly as expected.</li> <li>- Project takes users into account.</li> </ul>	<ul style="list-style-type: none"> <li>- Some tasks from the module are completed.</li> <li>- Some functionality is missing and overall not operating as expected.</li> <li>- Project shows some</li> </ul>	<ul style="list-style-type: none"> <li>- Barely any tasks from the module are completed.</li> <li>- Most functionality is absent.</li> <li>- Project does not demonstrate an awareness of the user.</li> </ul>

sensibility and takes users into account. - Project achieves learning objective.	- Project achieves learning objective.	evidence of taking users into account. - Project partially achieves learning objective.	- Project does not demonstrate goal or learning objective at all.
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## Independent project

<b>Weight</b>	20%		
<b>Description</b>	Students will create their own project to gain the VR Development badge at the end of the pathway. At the end of the final mission, they will apply the skills and knowledge from all previous modules to their own project.		
<b>Purpose</b>	To give students an opportunity to apply the skills they have learned in a practical and less controlled environment.		
<b>4 - Excellent</b>	<b>3 - Good</b>	<b>2 - Fair</b>	<b>1 - Unsatisfactory</b>
- All tasks from the module are implemented in the independent project. - All functionality is present and operating exactly as expected. - Project demonstrates a clear design sensibility and takes users into account. - Project achieves learning objective.	- Most tasks from the module are implemented in the independent project. - All functionality is present and operating mostly as expected. - Project takes users into account. - Project achieves learning objective.	- Some tasks from the module are implemented in the independent project. - Some functionality is missing and overall not operating as expected. - Project shows some evidence of taking users into account. - Project partially achieves learning objective.	- Barely any tasks from the module are implemented in the independent project. - Most functionality is absent. - Project does not demonstrate an awareness of the user. - Project does not demonstrate goal or learning objective at all.

## Quizzes

<b>Weight</b>	20% 4 × 5% each)
<b>Description</b>	Students complete up to 10 multiple choice questions.

<b>Purpose</b>	To give students the opportunity to apply and check their knowledge in a decontextualized environment, which will also help prepare them for the Unity Certified User exam.		
<b>4 - Excellent</b>	<b>3 - Good</b>	<b>2 - Fair</b>	<b>1 - Unsatisfactory</b>
9-10 out of 10 correct	7-8 out of 10 correct	5-6 out of 10 correct	Fewer than 5 out of 10 correct

## Optional growth mindset rubric

Derived from the work of Professor Carol Dweck of Stanford University, growth mindset is the understanding that we can incrementally develop our abilities and intelligence indefinitely through practice and effort. The opposite of a growth mindset is a fixed mindset: the belief that your intelligence and abilities are fixed or limited. A fixed mindset can be dangerous for learners because it can cause them to give up. A growth mindset underpins the desirable learning behaviors of resilience and grit; indicating perseverance when learning becomes difficult.

<b>Growth</b>	<b>Mixed</b>	<b>Fixed</b>
<ul style="list-style-type: none"> <li>- Look forward to the next challenge.</li> <li>- See mistakes as temporary setbacks: something to be overcome.</li> <li>- Reflect on what you learned and apply that learning.</li> <li>- Invite feedback and criticism and apply it to improve your project.</li> <li>- Use different strategies and ask others about their strategies.</li> <li>- Show stamina while working on your project until it is complete.</li> <li>- Ask specific questions, including questions about your own thinking, and challenge others' ideas.</li> <li>- Show confidence in taking risks and happily share mistakes you make and what you learn.</li> </ul>	<ul style="list-style-type: none"> <li>- Take on challenges after having success in related challenges.</li> <li>- Motivated by feedback when it isn't too critical and if you are comfortable with the person providing feedback.</li> <li>- Open to strategies that help to meet a challenge but tend to work on things you are already good at.</li> <li>- Persevere with prompting and support.</li> <li>- Ask questions about things in Unity that you feel more confident with, but are less likely to do so if it is outside your comfort zone.</li> <li>- Take risks if the task is already fairly familiar to you.</li> </ul>	<ul style="list-style-type: none"> <li>- Do not want to take on challenges alone.</li> <li>- See mistakes and failures as proof the task is too difficult and not worth pursuing.</li> <li>- Avoid feedback or see it as a reason to give up.</li> <li>- Do not demonstrate any effective strategies for accomplishing project tasks or goals.</li> <li>- Show little or no persistence through challenges.</li> <li>- Do not ask questions or seek guidance and support.</li> <li>- Do not take risks.</li> </ul>