

VIA University College, The Animation Workshop

# Creative Simulation Technologies 2022

5<sup>th</sup> September to 25<sup>th</sup> November 2022

*Learn how to create beautiful simulations! Dive into Houdini, TouchDesigner, Unreal and coding in this exciting course, taught by specialists from the VFX industry!*

## Course program

Week 1	5 - 9 September	<b>Intro, Overview &amp; Software</b>
Week 2	12 - 16 September	<b>Research, Planning &amp; Problem Solving</b>
Week 3	19 - 23 September	<b>Houdini</b>
Week 4	26 - 30 September	<b>Houdini</b>
Week 5	3 - 7 October	<b>TouchDesigner</b>
Week 6	10 - 14 October	<b>Coding</b>
Week 7	17 - 21 October	<b>Coding</b>
Week 8	24 - 28 October	<b>Game Engine</b>
Week 9	31 Oct - 4 Nov	<b>Houdini &amp; Game Engine Integration</b>
Week 10	7 - 11 November	<b>Project Work</b>
Week 11	14 - 18 November	<b>Project Work</b>
Week 12	21 - 25 November	<b>Finalization &amp; Marketing</b>



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# Houdini & Simulation 2022 – detailed program

## Summary

Through the Creative Simulation Technologies course, participants will master the craft of computer simulation in various forms. Participants will study and implement graphical, physics-based solvers as well as real-time simulations. The foundation of the course is based on Houdini, and additional software training includes Touch Designer, basic programming, and the game engine Unreal. With the study of these four elements - Houdini, TouchDesigner, coding, and Unreal – an artist has complete technical and artistic freedom with simulation; at the heart and edge of computer technology. On completion, students will showcase highly specialized knowledge of node-based procedural workflows. Projects will take the form of well-presented simulations in tandem with case studies targeted toward bringing new ideas into Europe's diverse art and technology markets (film/games/animation/sciences).

## **Participant projects**

Participants will work on an individual simulation project throughout the course. The participants choose a specific natural phenomenon that they must research. They will then have to recreate the phenomenon, or combine elements from different natural phenomena, as computer simulations. They can choose to render the end-product, the animated film sequence, in different ways, for instance realistically, graphically, or based on a game aesthetic, but the actual simulations in the scene will behave realistically based on the laws of physics. As a result, the participants' final projects are short animated clips consisting of well-executed computer simulations combined with detailed case studies documenting their workflow and considerations throughout the process. Case studies are important for the participants' own creative process, but equally important for knowledge sharing and further development of the field.

## Modules

### **Week 1 - Introduction, Overview, Software introductions and theory**

Teacher: Andrew Lowell, US. Houdini FX Trainer / Technical Director. For many years Andrew has been recognized by industry as an FX TD and trainer. Movie credits/studios include *Mummy 3*, *Aliens in the Attic*, *Invictus*, *Thor*, *Sucker Punch*, *Transformers 3*, *Jack the Giant Slayer*, and *Ender's Game* at studios such as Digital Domain, Rhythm and Hues, and Animal Logic. He's conducted many seminars around the world and written articles, authored a Houdini book, and also conducts formal training at dedicated institutions such as The Animation Workshop, VIA UC and FXPHD.

The first week of the course will consist of basic orientation activities and personal introductions. The software used for the course will be introduced in a tour and demonstration sense. Lectures consist of broad reaching theory of simulation technologies as well as basic introductions to the varied software used in the course.



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## **Week 2 – Research, Planning & Problem solving**

Teacher: Andrew Lowell, US. Houdini FX Trainer / Technical Director.

This week will serve to get the ball rolling for future lectures as well as project work. Student tasks will consist of project idea generation, research, and planning. Students will research existing solutions and precedents for solving the simulation task. Also research into the science, art, and role of such simulations and phenomenon should be undertaken. The final group screening at the end of the week will showcase project ideas for approval to the instructor.

## **Week 3 - Houdini lectures and classwork**

Teacher: Andrew Lowell, US. Houdini FX Trainer / Technical Director.

Primarily a lecture week covering fundamentals on 3D geometry, forming the foundation for many projects. Houdini is used as the core 3D program and this is used to generate many types of geometry using the SOPs context. Basic lessons will loosely correlate with student project needs; while ensuring geometry fundamentals are taught as the primary focus.

## **Week 4 - Houdini lectures and classwork**

Teacher: Andrew Lowell, US. Houdini FX Trainer / Technical Director.

A lecture week with a focus on dynamics simulation in Houdini. Theory and application of complex physics based solvers is explored with examples and lectures. A variety of different simulations such as rigid bodies, fluids, and crowd should be introduced. This lecture week gives necessary knowledge to complete non-real time, highly accurate simulations for projects.

## **Week 5 - TouchDesigner lectures and classwork**

Teacher: Andrew Lowell, US. Houdini FX Trainer / Technical Director.

This week covers real-time simulation technology and theory using TouchDesigner software. Students already have a basis from their Houdini studies as TouchDesigner is Houdini's real-time cousin. Lectures should be divided into introductory and in-depth categories by the instructor so that students notably without real-time/interactive components to their projects can optionally continue project work instead of undergo lectures.

## **Week 6 - Coding lectures and classwork**

Teacher: Jeronimo Maggi, IT/AR. FX Technical Director at Method Studios. Pipeline TD. Houdini instructor at FXPHD.

The first of two weeks dedicated to taking more manual control over a simulation via coding. This could take the form of a custom IO between a type of data and the simulation package, or create an optimized workflow within a program/engine. The first week focuses on coding basics in a variety of languages such as Python, and C++. Students who need a minimal amount of coding for their projects can opt out of the more advanced lectures to continue project work.



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## **Week 7 - Coding lectures and classwork**

Teacher: Jeronimo Maggi, IT/AR. FX Technical Director at Method Studios. Pipeline TD. Houdini instructor at FXPHD.

The second week of coding involves project application in its raw form or in one of the other applications such as Houdini, TouchDesigner, or the game engine Unreal. The instructor will guide the students in setting milestones throughout the week complemented by lectures specific to project needs.

## **Week 8 – Game engine – lectures and classwork**

Teacher: Adam Funari, US. Terrain and Technical Artist at Offworld Industries.

The industry standard game engine Unreal is introduced and explored. This will give students the ability to tailor their projects in an accelerated user interactive environment. Lectures should be divided into introductory and in-depth categories by the instructor so that students notably without the needs of a game engine in their projects can optionally continue project work instead of undergo lectures.

## **Week 9 – Houdini & Game engine integration – lectures and classwork**

Teacher: Adam Funari, US. Technical Artist at Offworld Defense Simulations.

As a continuation of the game engine week, this week will shift focus to integration. Houdini will be used for procedural asset generation for accelerated environments as well as tool building with the Houdini Engine. Students without strong game-engine needs in their projects can optionally focus on project work while opting out of lectures.

## **Week 10 – Project work**

Teacher: Andrew Lowell, US. Houdini FX Trainer / Technical Director.

This week is solely dedicated to project work. Students will use their previously gained knowledge of simulation software to carry out their project objectives. Strict milestones for development will be adhered to with an emphasis on global completion.

## **Week 11 – Project work**

Teacher: Andrew Lowell, US. Houdini FX Trainer / Technical Director.

This week is solely dedicated to project work. Students will use their previously gained knowledge of simulation software to carry out their project objectives. Strict milestones for development will be adhered to with an emphasis on simulation tweaking and finalization.

## **Week 12 - Finalization and marketing, applications**

Teacher: Andrew Lowell, US. Houdini FX Trainer / Technical Director.



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The final week of the course should focus on showcasing and marketing work as opposed to the creation of new assets. A case study will be assembled as complementary and supporting explanations of the work undertaken for prospective employers. Research into companies of interest is also undertaken.

### **Format of teaching**

We do not have any teachers on staff at The Animation Workshop, VIA University College. Instead, we bring in professional artists from studios to teach for a limited number of weeks. In general, the teacher will do lectures/demos in the mornings followed by exercises and project work in the afternoons. Hands-on sessions are accompanied by 1-on-1 feedback or dailies and weeklies with the whole group. The classroom is set up with a computer for each of the (up to) 16 participants, and a teacher computer hooked up to a projector, making it easy to switch between demos/lectures and hands-on work.

### **Course instructional method**

- Lectures, demonstrations, walk-throughs from instructors/industry practitioners, hands-on work, guided mentorship through notable stages of individualized projects.
- Biweekly milestone review. Weekly group critique.
- All modules will include lectures and extensive hands-on experience.

### **Class hours**

Normal class hours are 9:00 to 16:00.



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