UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH

Course guide
804406 - TEV - Visual Effects (Vfx) Techniques

Last modified: 04/09/2024

Unit in charge:	Image Processing and Multimedia Technology Centre
Teaching unit:	804 - CITM - Image Processing and Multimedia Technology Centre.

Degree: BACHELOR'S DEGREE IN DESIGN, ANIMATION AND DIGITAL ART (Syllabus 2023). (Compulsory subject).

Academic year: 2024   **ECTS Credits:** 6.0   **Languages:** Catalan

LECTURER

Coordinating lecturer: Fuentes, Arturo
Coll, Cintia

Others:

TEACHING METHODOLOGY

Directed learning classes are structured into two-hour sessions. During part of the sessions, the teacher exposes the theoretical concepts and exemplifies them through examples that are solved, as far as possible, in a participatory way by the students. Another part of the session is dedicated to students practicing the concepts introduced by solving a series of exercises proposed by the teaching staff and, when appropriate, time will also be dedicated to resolving doubts and problems that they have encountered during the completion of the exercises. the exercises. Intensive use will be made of the virtual campus, both to publish the subject material (notes, problem statements, proposed solutions, compilation of links, etc.) and as a communication mechanism to publish notices, request revisions of the different tests, etc

LEARNING OBJECTIVES OF THE SUBJECT

- Recognize the history and technologies of the various visual effects development techniques.
- Apply the processes and techniques for editing audiovisual projects.

STUDY LOAD

Type	Hours	Percentage
Hours large group	30,0	20.00
Hours medium group	18,0	12.00
Guided activities	12,0	8.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

VFX Theoretical part

Description:
1. WHY VISUAL EFFECTS?

- Introduction
- Special and visual effects
- History

- Organization chart in the industry
- Software
- Learn to look

2. PRE-PRODUCTION:

- Working with the production and management unit
- Design of the shots:
- Storyboards
- Concept art
- Movement
- CG characters
- Photorealism

- Pre viewing
-- In real time
-- VR

3. CAPTURE:

- Green screen
- Virtual seven A new model.
- Data acquisition:
- Camera tracking
- Cyberscanning
- HDRI
- Lidar/Laser
- 3D: photogrammetry
- VFX photography
- High speed photography
- Motion capture:
-- Mocap
-- Project need and limitations
-- Specific markers for body parts
-- Rigging for motion capture

4. 3D

- How it works
- Design for 3D
- Creative use of depth
- 3D visual effects
- Artistic skills

5. POST-PRODUCTION

- Image resolution and format
- Color
-- Guidelines
-- Color coding
-- ACES.Academy Color Encoding System
- Working in a team
- Rotoscopy
- Matte painting

6. CREATION OF DIGITAL ELEMENTS

- Modeling
- Rigging Animation
- Textured

- Digital Hair/Fur
- Simulation of dynamics
- Simulation of crowds
- Particles
- Rigid-Body dynamics
- Digital light
- Shader
- Work in digital composition:
-- Removal of elements
-- Retouch
-- Digital makeup
-- Transformations
- 2D composition
- 2.5D composition
- 3D composition

7. ANIMATION AND VISUAL EFFECTS

- Differences
-Pipeline of an animated film

8. ARTIFICIAL INTELLIGENCE AND VISUAL EFFECTS

- Introduction AI and generative models
- Workflow integration

Full-or-part-time: 75h
Theory classes: 30h
Self study : 45h

VFX Practical part

Description:
1. Supervision of VFX on the shoot and introduction to the Nuke software.
- What is the function of a VFX supervisor on a shoot.
- Cameras, color cards, lens distortions, tracking, chromas, etc.
- Introduction to the Nuke interface
- Layers vs. nodes

2. Creating a project in Nuke, color management, and what tools we have.
- How we adjust the settings according to the project.
- Color management in a VFX project.
- Introduction to the available nodes we have in Nuke and how we connect them.
- Grading.
- Node concatenation rules.
- Nukepedia and Nuke survival ToolKit.

3. Blending modes, blur vs. defocus and the Noise node.
- What are the different fusion modes that we can find in Nuke, which one should we use in each case.
- What is the difference between a Blur and a Defocus? Which nodes exist in each case?
- Everything we can achieve with the Noise node.

4. Denoise, rotoscopy and Clean up techniques.
- Techniques to remove grain and noise in images.
- How to create a rotoscope in Nuke and ways to apply it to our composition, and methods to modify masks.
- The different Clean up techniques: Clean plates, Rotopaint, KeyMix.

5. 2D tracking techniques and screen integration.
- Tracking and 2D transformation techniques: Track, CornerPin, Planar tracker.

- How are the screens recorded?
- Replacement of TV and mobile screens, and elements that help us create a realistic integration: Reflexes, glow, moiré, pollution.

6. 3D tracking techniques, match move and 3D projections.
- Tracking and match move 3D techniques: Camera track and export of 3D cameras.
- 3D scenes in Nuke.
- 3D projections and their uses.

7. Chroma Keying:
- How a chroma works and what happens inside Nuke.
- Preparation of a plan to make a chroma.
- Core matte and edge matte, and the nodes we have to make a chroma: Primatte, Keylight, IBK.
- Premult and unpremult.
- Stripping techniques.
- Edge treatments. Edge extend, Lightwrap, Additive Key.

8. CGI Composition:
- What are AOVs
- AOV setup and modiï¬cations we can make to a CG render.
- Cryptomatte.
- Integration of 3D elements in a real environment.

9. Application of spherical and anamorphic lens aberrations, analog film simulation, and tech checking.
- Simulation of vignetting, chromatic aberration, image grain.
- Anamorphic lenses and how to simulate their particularities.
- How to simulate an analog film.
- How to perform a Tech check, and ensure that the composition maintains the expected quality.

10. SmartVectors, Morphing, distortions and particles.
- What are SmartVectors, and what are their uses.
- Morphing techniques.
- How to create from scratch different types of distortions (Water, heat, reflections,...), and what tools we have available.
- Particle systems in Nuke.

11. Creation of own tools, modification of existing tools and the usefulness of expressions.
- How to create your own guizmo.
- Modification of an existing node to add extra controls.
- Usefulness of mathematical expressions in Nuke.

Full-or-part-time: 75h
Theory classes: 30h
Self study : 45h

GRADING SYSTEM

Partial exam 20%
Final exam: 20%
Practices 1-9: 30%
Final practice: 20%
Participation and learning attitude: 10%

- Students who take part in the continuous assessment and do not pass this subject, will be able to take the reassessment test in which the theoretical content will be reassessed (partial exam and final exam).

EXAMINATION RULES.

Some of the exercises can be done during classes with the subject teacher. Students will also have to dedicate autonomous work time (out of hours) to complete the exercises. To do so, the instructions specified in the working document must be followed.

Once completed, the exercise will be deposited in the Virtual Campus upon delivery to the section classroom on the corresponding date. Only those exercises delivered before the deadline will be taken into account for evaluation.

The documents must be completed, following the instructions, especially regarding file names. The correct management of the documentation provided is an aspect of the skills to be acquired and part of the evaluation.

Irregular actions that can lead to a significant variation in the grade of one or more students constitute a fraudulent performance of an assessment act. This action entails the descriptive qualification of suspension and a numerical grade of 0 in the overall ordinary assessment of the subject, without the right to re-evaluation.

If the teachers have indications of the use of AI tools not allowed in the assessment tests, they can call the students involved to an oral test or a meeting to verify their authorship.

BIBLIOGRAPHY

Basic:

- Jeffrey A. Okun, Susan Zwerman. The VES Handbook of Visual Effects: Industry Standard VFX Practices and Procedures. Routledge, 2020.
- Steve Wright. Digital Compositing for Film and Video: Production Workflows and Techniques. Routledge, 2017.
- Benjamin Bratt. Rotoscoping: Techniques and Tools for the Aspiring Artist. Routledge, 2011.
- Laura Frank. Real-Time Video Content for Virtual Production & Live Entertainment. Routledge, 2023.