



# Course guide

## 804064 - TEIA - Emerging Technologies and Artificial Intelligence

Last modified: 02/10/2024

**Unit in charge:** Image Processing and Multimedia Technology Centre  
**Teaching unit:** 804 - CITM - Image Processing and Multimedia Technology Centre.  
**Degree:** BACHELOR'S DEGREE IN MULTIMEDIA STUDIES (Syllabus 2009). (Optional subject).  
**Academic year:** 2024    **ECTS Credits:** 6.0    **Languages:** English

### LECTURER

**Coordinating lecturer:** Caldas Pires, Bruno

**Others:**

### TEACHING METHODOLOGY

- Master demo classes.
- Class participation.
- Case studies.
- Autonomous Work.

### LEARNING OBJECTIVES OF THE SUBJECT

Demonstrate mastery in developing creative applications in emerging supports, as well as in artificial intelligence-based media.

### STUDY LOAD

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

**Total learning time:** 150 h



## CONTENTS

### Blockchain

**Description:**

How does a blockchain work  
Proof of work, proof of stake  
Main ecosystems  
NFT

**Specific objectives:**

Learn how to use blockchains

**Full-or-part-time:** 25h

Theory classes: 3h  
Practical classes: 5h  
Guided activities: 2h  
Self study : 15h

### 3D printing

**Description:**

Types and principles of 3D printing  
3D printing techniques  
3D printing software

**Specific objectives:**

Learn to design models and print them on a 3D printer

**Full-or-part-time:** 25h

Theory classes: 3h  
Practical classes: 5h  
Guided activities: 2h  
Self study : 15h

### Photogrammetry

**Description:**

Photogrammetry techniques  
Use of photogrammetry in 3D environments

**Specific objectives:**

Learn photogrammetry techniques

**Full-or-part-time:** 25h

Theory classes: 3h  
Practical classes: 5h  
Guided activities: 2h  
Self study : 15h



## Introduction to AI

### Description:

History of AI  
The neuron model, multilayer networks  
Training  
Virtual machines: Colab, Vast.ai, Huggingface

### Specific objectives:

Learn the principles and the history of AI

### Full-or-part-time: 12h 30m

Theory classes: 3h  
Guided activities: 2h  
Self study : 7h 30m

## Large language models

### Description:

History of LLMs  
How transformers work  
Different models and their functions  
Programming LLMs in natural language

### Specific objectives:

Learn the principles and use of LLMs

### Full-or-part-time: 12h 30m

Theory classes: 1h  
Practical classes: 1h 30m  
Guided activities: 2h 30m  
Self study : 7h 30m

## Audio and AI

### Description:

Song generation  
Voice generation  
Effects generation  
Audio treatment

### Full-or-part-time: 12h 30m

Theory classes: 1h 30m  
Practical classes: 2h  
Guided activities: 1h 30m  
Self study : 7h 30m



## AI and images

### Description:

GANs and Stable Diffusion

Text to image: machine cognition

Software: Automatic 1111, Fooocus, ComfyUI

Aesthetic control resources: ControlNet, Lora, Embeddings

Image treatment

Training

### Full-or-part-time: 25h

Theory classes: 3h

Practical classes: 5h

Guided activities: 2h

Self study : 15h

## Video and AI

### Description:

Video generation

Video treatment

### Full-or-part-time: 12h 30m

Theory classes: 1h 30m

Practical classes: 2h 30m

Guided activities: 1h

Self study : 7h 30m

## GRADING SYSTEM

Task 1: Publish NFT

Task 2: From model to print, from print to model: photogrammetry with 3D printing 10%

Task 3: LLM application

Task 4: Replicate images and represent concepts

Task 5: Creating characters with LLM and image synthesis 10%

Task 6: COMfyUI workflow with video generation 10%

Final project: 30%

Class participation: 10%

Irregular actions that may lead to a significant variation in the grade of one or more students constitute a fraudulent performance of an evaluation act. This action will lead to a descriptive grade of fail and a numerical grade of 0 for the ordinary global assessment of the subject, without the right to re-evaluation.

If the teachers have evidence of the use of AI tools that are not permitted in the assessment tests, they may summon the students involved to an oral test or a meeting to verify the authorship.



## BIBLIOGRAPHY

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### Basic:

- "Aesthetic Issues". Caldas Vianna, Bruno. The poetics of autopoiesis : visual arts, autonomy and artificial intelligence [on line]. p. 167 Available on: <https://taju.uniarts.fi/handle/10024/8130>.
- Ted Chiang. Why AI isn't going to make art [on line]. Available on: <https://www.newyorker.com/culture/the-weekend-essay/why-ai-isnt-going-to-make-art>.
- Arroyo Guardado, David; Díaz Vico, Jesús; Hernández Encinas, Luis. Blockchain [on line]. Available on: [https://discovery.upc.edu/discovery/fulldisplay?docid=alma991005161479306711&context=L&vid=34CSUC\\_UPC:VU1&lang=ca&search\\_scope=MyInst\\_and\\_CI&adaptor=Local%20Search%20Engine&tab=Everything&query=any,co](https://discovery.upc.edu/discovery/fulldisplay?docid=alma991005161479306711&context=L&vid=34CSUC_UPC:VU1&lang=ca&search_scope=MyInst_and_CI&adaptor=Local%20Search%20Engine&tab=Everything&query=any,co). ISBN 9788490976845 .
- Berchon, Mathilde. La Impresión 3D : guía definitiva para makers, diseñadores, estudiantes, profesionales, artistas y manitas en general [on line]. Available on: [https://discovery.upc.edu/permalink/34CSUC\\_UPC/rdgucl/alma991004092129706711](https://discovery.upc.edu/permalink/34CSUC_UPC/rdgucl/alma991004092129706711). ISBN 9788425228544.

### Complementary:

- Mitchell, Melanie. Artificial Intelligence: A Guide for Thinking Humans. ISBN 9788418895357.
- Boden, Margaret. Artificial Intelligence: A Very Short Introduction. ISBN 9788418895357.
- Ted Chiang. ChatGPT is a blurry jpeg [on line]. Available on: <https://www.newyorker.com/tech/annals-of-technology/chatgpt-is-a-blurry-jpeg-of-the-web>.
- Bruno Caldas Vianna. Generative Art: Between the Nodes of Neuron Networks [on line]. Available on: <https://www.raco.cat/index.php/Artnodes/article/view/374003>.

## RESOURCES

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### Other resources:

- Everything is a remix, part 4: <https://www.youtube.com/watch?v=X9RYuvPCQUA> />ComfyUI (software) <https://github.com/comfyanonymous/ComfyUI> />Automatic1111 (software) <https://github.com/AUTOMATIC1111/stable-diffusion-webui> />Ollama (resource) <https://ollama.com>