Course guide
804489 - TEIA - Emerging Technologies and Artificial Intelligence

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

Degree: BACHELOR'S DEGREE IN DIGITAL DESIGN AND MULTIMEDIA TECHNOLOGIES (Syllabus 2023). (Optional subject).

Academic year: 2025   **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

Knowledge
Identify the main emerging technologies currently used by industry, as well as some of the fundamentals of artificial intelligence.

Skills
Apply knowledge related to data visualisation from a research and applied-professional point of view, in order to have a basic command of how to work with data: collect, transform, represent and present it.

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

STUDY LOAD

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

Total learning time: 150 h

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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

Basic:

- "Aesthetic Issues". Caldas Vianna, Bruno. The poetics of autopoiesis : visual arts, autonomy and artificial intelligence [on line]. p. 167Available 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 Guardeño, 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. 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. 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

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