Course title: Artificial Intelligence, Creativity and the Arts
Language of instruction: English
Professor: Rafael Ramirez-Melendez
Professor's contact and office hours: Anytime with a previous appointment
Course contact hours: 45
Recommended credit: 6 ECTS credits
Course prerequisites: there are no prerequisites for this course

Language requirements:
Recommended level in the European Framework B2 (or equivalent : Cambridge Certificate if the teaching language is English, DELE or 3 semesters in the case of Spanish).

Course focus and approach:
This course discusses the impact of artificial intelligence (AI) in the arts and other creative processes. Students will learn the fundamentals of AI and understand its implications in creativity and the arts.

Course description:
Students will learn the fundamentals of Artificial Intelligence (AI) and understand the implications of AI techniques in creative processes and, in particular, in the arts. During the course, students will explore the intersections of technology, creativity, arts and music and how artificial intelligence can contribute to these areas in exciting and innovative ways. Students will gain a deeper understanding of the potential of artificial intelligence as a tool for artistic expression and creativity. From generative music to computer-generated poetry, we will explore how AI can be used to create new forms of art that challenge our preconceived notions of what it means to be creative. Secondly, students will examine the ethical implications of AI, particularly in the context of the arts. We will talk about AI and biases and discuss strategies for creating AI systems that are more equitable and inclusive. The course will encourage students to explore the intersections of AI and creativity. Through class discussions and project work, we will share ideas, perspectives, and experiences that will enrich the students' understanding of this field. Hopefully, beyond the course, students will continue exploring AI's potential in creative processes, embrace the opportunities that arise from combining their creative talents with technological innovation, and create meaningful and impactful work.

Learning objectives:
At the end of this course, the students will be able to:

1. Understand the basic principles, concepts and techniques of artificial intelligence and its potential for use in a creative context.
2. Analyse and critically evaluate the ethical implications of using AI in the context of creativity and culture.
3. Understand the intersection of technology and the arts and identify opportunities for innovation and collaboration.
4. Develop practical skills in using AI technologies for creative purposes, such as generative music, computer-generated poetry, and music interfaces.
5. Collaborate effectively with peers on creative projects that incorporate AI technologies.
6. Reflect on personal values and ethical considerations related to the use of AI in creative contexts.
7. Generate creative ideas for using AI in innovative and impactful ways.
8. Communicate effectively about the role of AI in the arts and culture to a variety of audiences.
9. Develop a lifelong interest in exploring the intersections of AI, creativity, and the arts.

These learning objectives aim to provide students with a well-rounded understanding of the use of AI in creative contexts and the skills and knowledge needed to apply this understanding in practice. Through the achievement of these learning objectives, students should be prepared to engage with AI technologies in creative and ethical ways, and to the ongoing dialogue about the role of AI in the arts, and create meaningful and impactful work that combines artistic talents with technological innovation.

Course workload:
The course will include lectures, readings, exams and hands-on activities. Lectures will present the theory, readings will be used both to introduce topics, as well as to go in depth in certain areas, exams will evaluate the knowledge acquired and hands-on activities will apply the knowledge gained during the lectures.

Teaching methodology:
The course consists of four main components:

- Discussions about the new role of AI in creative processes and the arts
- Concept learning based on hands-on labs
- Projects with practical applications
- Invited talks by experts using AI in the arts

Discussions on the new role of AI in the arts: This component introduces Artificial Intelligence and how it is changing creative processes and, in particular, the arts (music, dance, painting, etc.). Students will read texts about AI, creativity and the arts and will present and discuss their understanding of the topics.

Concept learning based on hands-on labs: This component introduces the basic concepts of the course through practical labs. After a brief and intuitive explanation, the students will directly carry out exercises on the computer, applying artificial intelligence with an artistic goal. Slides will be used to complement the explanations which will be distributed to students as class notes and study material. The explanations and the hands-on exercises will be interactive to motivate and stimulate critical thinking among the students.

Projects with practical application: Students will apply the concepts learnt to implement small art projects. In this component, students will work on a practical problem well defined by the teacher and will be supervised during the process. At the beginning of this process, the teacher will clearly explain the objectives of the project and will give instructions on how to achieve those objectives. Students may work in groups if necessary. The projects allow students to put into practice the concepts learned.

Invited talks by experts using AI in the arts: Experts and professionals working and applying AI to the arts will be invited to present their work as invited talks. These talks will provide students with a clear view of current work in the area as well as provide insights and ideas for their projects.

Assessment criteria:
Presentations: 25%
Projects: 25%
Midterm exam: 20%
Final exam: 20%
Class participation: 10%

Presentations: during the course the students will chose and do 2 presentations related to the course topics, i.e. AI methods, AI and its relation to the arts, and AI, arts and well-being.

Projects: students will apply the concepts learnt to implement small art projects. In this component, students will work on a practical problem well defined by the teacher and will be supervised during the process.
Midterm exam: this will cover both, open questions about the implication and relationship of AI and the arts, as well as concrete questions about the techniques and concepts presented in class.
Final exam: this will include questions about the whole course content.

BaPIS absence policy:
Attending class is mandatory and will be monitored daily by professors. Missing classes will impact on the student's final grade as follows:

Absences	**Penalization**
Up to two (2) absences	No penalization
Three (3) absences	1 point subtracted from final grade (on a 10-point scale)
Four (4) absences	2 points subtracted from final grade (on a 10-point scale)
Five (5) absences or more	The student receives an INCOMPLETE ("NO PRESENTADO") for the course

The BaPIS attendance policy does not make a distinction between justified and unjustified absences. All absences—whether due to common short-term illnesses or personal reasons—are counted toward the total amount and cannot be excused. Therefore, students are responsible for managing all their absences.

Only in cases of longer absences—such as hospitalization, prolonged illness, traumatic events, or other exceptional situations—will absences be considered for exceptions with appropriate documentation. The Academic Director will review these cases on an individual basis.

Students must inform the Instructor and the International Programs Office promptly via email if serious circumstances arise.

Classroom norms:
- No food or drink is permitted in class.
- Students will have a ten-minute break after one one-hour session.

Course Contents:

1: Introduction
- What is artificial intelligence?
- The Turing's test
- Induction
- Specific vs General Artificial Intelligence
- Interpretable Artificial Intelligence: Why is it important?

2: Machine Learning
- How does ML work?
- Main algorithms
- Generalisation and overfitting
- Machine Learning in the arts

3: Artificial Neural Networks
- Biological neural networks
- Artificial neural networks (ANN)
- Deep learning
- Hands-on practice exploring ANN

4: Generative Artificial Intelligence
- Artificial intelligence and generative models
- Large Language Models
- ChatGPT
- Image generation
- Music and audio generation
- Copyright and ethical implications of generative models

5: AI Ethics
- AI implications in the arts
- AI and copyright
- Ethical Generative Artificial Intelligence
- AI carbon footprint

6: Creative applications of AI
- Text-to-image systems
- Text-to-music systems
- AI and video
- AI in the film industry
- AI in architecture
- Hands-on creative AI

7: (Very) Basic Programming

- What is a programming language?
- Basic programming in Python
- Python application to arts and music
- Hands-on Python programming for artistic creation

8: AI Applications to Health and Well-being

- AI, health
- AI and Music Therapy
- Implications in stroke rehabilitation, emotional disorders, autism, Parkinson's disease

Required Readings: The professor will assemble a course pack and indicate mandatory texts.

Recommended bibliography:
Students are encouraged to consult the following sources.

- *Boden, M. 1991. The Creative Mind: Myths and Mechanisms. New York: Basic Books.*
- *Boden, M. (ed.) 1994. Dimensions of Creativity Cambridge, MA: The MIT Press.*
- *Boden, M. 2009. "Computers models of creativity." AI Magazine 30(3): 23–34.*
- *Bretan, M., and Weinberg, G. 2016. "A survey of robotic musicianship." Commun. ACM 59(5): 100–109.*
- *Bentley, P. J., and Corne, D. W. (eds.). 2001. Creative Evolutionary Systems. Burlington, MA: Morgan Kaufmann.*
- *Bharucha, J. 1993. "MUSACT: A connectionist model of musical harmony." In Machine Models of Music, S. M. Schwanauer and D. A. Levitt (eds.). Cambridge, MA: The MIT Press, 497–509.*
- *Colton, S., López de Mántaras, R., and Stock, O. 2009. "Computational creativity: Coming of age." Special issue of AI Magazine 30(3): 11–14.*
- *Colton, S. Halskov, J., Ventura, D., Gouldstone, I., Cook, M., and Pérez-Ferrer, B. 2015. "The Painting Fool sees! New projects with the automated painter." International Conference on Computational Creativity 2015: 189–196*
- *Dalmazzo D and Ramírez R (2019) Bowing Gestures Classification in Violin Performance: A*
- *Machine Learning Approach. Front. Psychol. 10:344. doi: 10.3389/fpsyg.2019.00344*
- *Gervás, P. 2009. "Computational approaches to storytelling and creativity." AI Magazine 30(3): 49–62.*
- *McCormack, J. 2014. "Balancing act: variation and utility in evolutionary art." In Evolutionary and Biologically Inspired Music, Sound, Art and Design. Lecture Notes in Computer Science, Vol. 8601. Heidelberg: Springer, 26–37*
- *McCormack, J., and d'Inverno, M. 2012. Computers and Creativity. Heidelberg: Springer.*
- *Mitchell, T.M., Machine Learning, Springer*

- *Ortega FJM, Giraldo SI, Perez A and Ramírez R (2019) Phrase-Level Modeling of Expression in Violin Performances. Front. Psychol. 10:776. doi: 10.3389/fpsyg.2019.00776*
- *Partridge, D., and Rowe, J. 1994. Computers and Creativity. Bristol: Intellect Books.*
- *Ritchie, G. D. 2009. "Can computers create humour." AI Magazine 30(3): 71–81.*
- *Ramirez, R., Maestre, E., Serra, X. (2012). A Rule-Based Evolutionary Approach to Music Performance Modeling, IEEE Transactions on Evolutionary Computation, 16(1): 96-107.*
- *Ramirez, R., Maestre, E., Serra, X. (2011). Automatic Performer Identification in Celtic Violin Audio Recordings, Journal of New Music Research, 40(2): 165–174.*
- *Ramirez, R., Maestre, E., Serra, X. (2010). Automatic performer identification in commercial monophonic Jazz performances, Pattern Recognition Letters, 31: 1514-1523.*
- *Ramirez, R., Perez, A., Kersten, S, Rizo, D., Román, P., Iñesta, J.M. (2010). Modeling Violin Performances Using Inductive Logic Programming, Intelligent Data Analysis, 14(5): 573-586.*
- *Ramirez, R., Hazan, A., Serra, X. (2008). A Genetic Rule-based Expressive Performance Model for Jazz Saxophone, Computer Music Journal, 32(1): 38-50.*
- *Turing, A. M. 1950. "Computing machinery and intelligence." Mind LIX(236): 433–460.*
- *Ian H. Witten, Eibe Frank, Mark A. Hall, Data mining: practical machine learning tools and techniques*
- *Yee-King, M., and d'Inverno, M. 2014. "Pedagogical agents for social music learning in crowd-based socio-cognitive systems." In Proceedings of the First International Workshop on the Multiagent Foundations of Social Computing, AAMAS-2014. Paris, France.*

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