FICHA DE UNIDADE CURRICULAR / CURRICULAR UNIT

Ano letivo / Academic year 2023/24 Curso / Course ERASMUS COURSE

Código/ Code	**Área Científica/ Scientific Area**	**ECTS**	**Obrigatória / Optativa Mandatory / Optional**	**Semestre/ Semester**	**Ano Curricular/ Curricular year**
	Informática	7.5	Optional	1	

Designação da unidade curricular / Curricular Unit
Basics of Artificial Intelligence (Programming knowledge required)

Distribuição de Horas de Contacto por tipo de Ensino / Distribution of Contact Hours by typology of education							
Total	Teórico / Theoretical	Teórico/Prático Theoretical / practical	Prático e Laboratorial / Practical and Laboratory	Trabalho de campo / Field work	Seminário / Seminar	Orientação Tutorial / Tutorial	Estágio / Traineeship
75	25	25	25				

Docente responsável e respetiva carga letiva na Unidade Curricular (preencher o nome completo) /Responsible teaching staff member and lecturing load in the curricular unit (fill in the full name)	**Correio eletrónico / Email**
Artur Manuel Sancho Marques	**artur.marques@esg.ipsantarem.pt**

Outros docentes e respetivas cargas lectivas na unidade curricular / Other Teaching staff and lecturing load in the curricular unit	**Correio eletrónico / Email**

Objetivos de Aprendizagem (conhecimento, aptidões e competências a desenvolver pelos estudantes)
Learning outcomes of the curricular unit (knowledge, skills and competences to be developed by the students)

The approved student is expected to:

(o1) Understand the concept of "Artificial Intelligence" (AI)/"machine intelligence", its origins and currents, as well as being sensitive to the importance of responsible and ethical approaches;

(o2) Be aware of some of the well-established languages and tools for developing AI solutions;

(o3) Know how to apply the studied languages and tools, to the development of concrete solutions for specific problems, namely in the areas of search, knowledge and learning;

(o4) Have the ability to abstract available solutions and pre-trained models, but also be capable of understanding their results and underlying theory.

Conteúdos programáticos

Syllabus

Introduction to Artificial Intelligence (AI)

- Concept

- Prominent areas

- History, milestones, case studies

- "Responsible" and "ethical" AI

Languages and Tools

- Selection

- Refresh/introduction to selected languages and tools

Search by intelligent agents

- Concepts and terminology: agent, state, initial state, actions, transition model, state space, objective(s), cost

- Programming of intelligent agent(s) for search

- Algorithms

Knowledge-based agents

- Concepts and terminology: logic, notation, operators, model, inference

- Programming with knowledge-based agents

Learning

- Concepts and terminology: classification, mappings, under/overfitting, supervised learning, transfer-learning, data pipeline, data augmentation

- Programming solutions for classifying inputs, using pre-trained models (transfer-learning); building models by different techniques, model assessment

Demonstração da Coerência dos Conteúdos Programáticos com os Objetivos de Aprendizagem da Unidade Curricular

Demonstration of the syllabus coherence with the curricular unit's learning objectives

The topics allow the student to walk a path that begins by discussing and understanding what "AI" is, the scope of the concept, and its multiple perspectives taken over the years, which have led to different areas of study. The computational power of the present and the transversal reach of "AI", demands a discussion on "responsible" and "ethical" AI (o1).

The practical development of solutions is done with languages and tools, which are to be selected and put into action (o2).

The selected languages and tools are applied to building software for specific search, knowledge and learning problems, gradually, as the related concepts are studied (o3).

This approach should translate in students capable of creating related solutions, including by reuse, with an understanding of the underlying fundamentals (o4).

Metodologia de Ensino (Avaliação incluída)

Teaching methodologies (including evaluation)

Presentations and case studies.

Hands-on AI software development.

Assessment:

Projects proposed by the student and agreed with the teacher (T)

Assessment element under teacher's control (E)

Final grade = 0.4 * T + 0.6 * E

Demonstração da Coerência das Metodologias de Ensino com os Objetivos de Aprendizagem da Unidade Curricular

Demonstration of the coherence between the teaching methodologies and the learning outcomes
The presentations and the case studies introduce and build the concepts, helping in their understanding. The hands-on development using the adopted solutions should translate to AI software creation skills.

Bibliografia de consulta /existência obrigatória / Bibliography (Mandatory resources):
Ertel, W. and N. T. Black (2017). Introduction to Artificial Intelligence, Springer. Bird, A., et al. (2019). The Python Workshop: Learn to code in Python and kickstart your career in software development or data science Packt Publishing. Ameisen, E. (2020). Building Machine Learning Powered Applications: Going from Idea to Product, O'Reilly Media.

Validação pelos Orgãos Competentes (nome e cargo)