

Course guide

270741 - NDVW - Normative and Dynamic Virtual Worlds

Last modified: 21/07/2022

Unit in charge: Barcelona School of Informatics
Teaching unit: 1004 - UB - (ENG)Universitat de Barcelona.
Degree: MASTER'S DEGREE IN ARTIFICIAL INTELLIGENCE (Syllabus 2017). (Optional subject).
Academic year: 2022 **ECTS Credits:** 4.5 **Languages:**

LECTURER

Coordinating lecturer: INMACULADA RODRÍGUEZ SANTIAGO
Others: Primer quadrimestre:
INMACULADA RODRÍGUEZ SANTIAGO - 10

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CEA10. Capability to understand advanced techniques of Human-Computer Interaction, and to know how to design, implement and apply these techniques in the development of intelligent applications, services or systems.
CEA7. Capability to understand the problems, and the solutions to problems in the professional practice of Artificial Intelligence application in business and industry environment.
CEA8. Capability to research in new techniques, methodologies, architectures, services or systems in the area of Artificial Intelligence.
CEP4. Capability to design, write and report about computer science projects in the specific area of Artificial Intelligence.

Generical:

CG1. Capability to plan, design and implement products, processes, services and facilities in all areas of Artificial Intelligence.

Transversal:

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.
CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.
CT6. REASONING: Capability to evaluate and analyze on a reasoned and critical way about situations, projects, proposals, reports and scientific-technical surveys. Capability to argue the reasons that explain or justify such situations, proposals, etc..

TEACHING METHODOLOGY

The course unit will be taught through a series of theoretic sessions discussing several real applications. In these sessions new concepts will be introduced and discussed between students. Group discussion is strongly encouraged. Research papers will be provided to study the state-of-the-art of the introduced concepts.

Students will develop practical assignments related to AI in games and virtual worlds. They also will analyse and study research papers and then propose some intelligent strategies in virtual environments. During the unit period, students will be assessed on in-class oral presentations.



LEARNING OBJECTIVES OF THE SUBJECT

2.Objectives referring to knowledge: Know cutting-edge technologies in the field of Virtual Environments, games and Virtual Worlds, and understand the role of artificial intelligence techniques in their development. Understand the importance of using Virtual Worlds (VWs), and in particular Normative and Dynamic Virtual Worlds, to enhance educational, social and business interactions within organizations. Go into the requirements of Normative Virtual Worlds, from the automatic generation of the 3D visualization of the normative environment to the simulation process of a normative virtual world, as well as their applications in real-life problems.

3.Objectives referring to abilities, skills: acquire the capacity of discuss and analyze different approaches underlying artificial intelligence in Virtual Environments. Be able of developing 3D simulation environments where both humans and software agents may participate. Evaluate different virtual worlds platforms and select the most adequate in a concrete case of study.

STUDY LOAD

Type	Hours	Percentage
Hours small group	7,5	6.67
Guided activities	3,0	2.67
Hours medium group	15,0	13.33
Hours large group	15,0	13.33
Self study	72,0	64.00

Total learning time: 112.5 h

CONTENTS

1. Introduction to Virtual Worlds and Games

Description:

This section introduces virtual worlds and games as virtual environments where the application of AI techniques provides the user with more dynamic and engaging experiences.

2. Artificial Intelligence in games

Description:

This section focuses on an overview of AI technologies applied in games for pathfinding, decision making, tactical and strategic and learning.

3. Artificial Intelligence in Virtual Worlds

Description:

This section covers the application of artificial intelligence techniques in the virtual world field. A virtual world is an ideal habitat to incorporate AI based components. In particular, agents based technology, shape grammars and intelligent objects can be used to enforce norms, generate and populate the virtual space with humans and software agents and enhance participants' experience.



ACTIVITIES

Theoretical knowledge acquisition

Description:

In this activity the student acquires knowledge about concepts related to games and virtual worlds fields of study.

Specific objectives:

2

Related competencies :

CEA8. Capability to research in new techniques, methodologies, architectures, services or systems in the area of ??Artificial Intelligence.

CEA10. Capability to understand advanced techniques of Human-Computer Interaction, and to know how to design, implement and apply these techniques in the development of intelligent applications, services or systems.

CEA7. Capability to understand the problems, and the solutions to problems in the professional practice of Artificial Intelligence application in business and industry environment.

CT6. REASONING: Capability to evaluate and analyze on a reasoned and critical way about situations, projects, proposals, reports and scientific-technical surveys. Capability to argue the reasons that explain or justify such situations, proposals, etc..

Full-or-part-time: 31h 12m

Theory classes: 14h

Practical classes: 4h

Guided activities: 0h 12m

Self study: 13h

Course practical assignments

Description:

In this activity the student will develop a practical assignment related to artificial intelligence techniques applied in virtual environments, games and virtual worlds.

Specific objectives:

3

Related competencies :

CG1. Capability to plan, design and implement products, processes, services and facilities in all areas of Artificial Intelligence.

CEP4. Capability to design, write and report about computer science projects in the specific area of ??Artificial Intelligence.

CEA8. Capability to research in new techniques, methodologies, architectures, services or systems in the area of ??Artificial Intelligence.

CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

Full-or-part-time: 70h 30m

Theory classes: 4h

Laboratory classes: 22h 30m

Guided activities: 4h

Self study: 40h

Proposal, presentation and discussion of a project using artificial intelligence either in a game or virtual environment

Description:

In this activity the student will propose and defend in an oral presentation a project involving artificial intelligence either in a game or virtual environment for e-* applications (e-bussiness, e-learning, e-simulation)

Specific objectives:

2, 3

Related competencies :

CG1. Capability to plan, design and implement products, processes, services and facilities in all areas of Artificial Intelligence.

CEP4. Capability to design, write and report about computer science projects in the specific area of Artificial Intelligence.

CEA8. Capability to research in new techniques, methodologies, architectures, services or systems in the area of Artificial Intelligence.

CEA10. Capability to understand advanced techniques of Human-Computer Interaction, and to know how to design, implement and apply these techniques in the development of intelligent applications, services or systems.

CEA7. Capability to understand the problems, and the solutions to problems in the professional practice of Artificial Intelligence application in business and industry environment.

CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

CT6. REASONING: Capability to evaluate and analyze on a reasoned and critical way about situations, projects, proposals, reports and scientific-technical surveys. Capability to argue the reasons that explain or justify such situations, proposals, etc..

Full-or-part-time: 18h

Laboratory classes: 4h 30m

Guided activities: 3h 30m

Self study: 10h

GRADING SYSTEM

Students will work in groups. Each group will expose and present results of the practical project and a report related to the proposal of incorporation of AI in virtual environments. Marks for oral presentations, project development and submitted reports will be awarded on an individual basis.

BIBLIOGRAPHY

Basic:

- Buckland, M. Programming game AI by example. Wordware, 2005. ISBN 1556220782.
- Millington, I. AI for games [on line]. 3rd ed. CRC Press, 2019 [Consultation: 19/04/2023]. Available on: <https://www-taylorfrancis-com.recursos.biblioteca.upc.edu/books/mono/10.1201/9781351053303/ai-games-third-edition-ian-millington>. ISBN 9781351053303.
- Heudin, J.-C. Virtual worlds: synthetic universes, digital life and complexity. Perseus book, 1999. ISBN 0738200506.
- Verth, J.M.V.; Bishop, L.M. Essential mathematics for games and interactive applications: a programmers guide. 2nd ed. Amsterdam; Boston: Morgan Kaufmann Publishers, 2008. ISBN 9780080878614.
- Stephenson, N. Snow crash. Gigamesh, 2005. ISBN 849620832X.
- Bartle, R.A. Designing virtual worlds. New Riders, 2004. ISBN 0131018167.



RESOURCES

Hyperlink:

- <http://campusVirtual.up.edu>