Course guides
804245 - IAVJ - Artificial Intelligency

Last modified: 02/07/2021

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

Degree: BACHELOR'S DEGREE IN VIDEO GAME DESIGN AND DEVELOPMENT (Syllabus 2014). (Compulsory subject).

Academic year: 2021 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish, English

LECTURER

Coordinating lecturer: Kanaan Izquierdo, Samir

Others: Escudero Bakx, Gerard

PRIOR SKILLS

Knowledge about graf theory and coding in C++

TEACHING METHODOLOGY

During each class, the lecturer will first show the students the theory behind the problem that needs solving. Together with the students, the lecturer will explore the different solutions that exist in the present that solve and simplify the complexities of real time applications like videogames.

LEARNING OBJECTIVES OF THE SUBJECT

- Understand the basis of classic Artificial Intelligence areas like genetic algorithms and neural networks.
- Good knowledge of the most common AI techniques used in video games like hierarchical state machines and rule systems.
- Get familiar with advanced navigation tools like sectorization.
- Explore the newest methods in video game AI like Behavior Trees and Planners.

STUDY LOAD

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

Total learning time: 150 h

CONTENTS

AI Agent navigation

Description:
Kinetic movement
Map Markup
Steering behaviors
Coordinating movement for groups

Full-or-part-time: 20h
Theory classes: 8h
Self study : 12h

Pathfinding systems

Description:
The base of Dijkstra, A*
Navigation Mesh and sectorization
Path beautification
Common improvements on A*

Full-or-part-time: 20h
Theory classes: 8h
Self study : 12h

Perception Systems

Description:
Simulating senses
Level Markup techniques

Full-or-part-time: 10h
Theory classes: 4h
Self study : 6h

Decision making for videogames

Description:
Hierarchical state machines
Rule systems
Fuzzy logic
Scripting

Full-or-part-time: 15h
Theory classes: 6h
Self study : 9h

Advanced systems for decision making

Description:
Sharing information with Blackboards
SmartObjects
Behavior Trees
Planners

Full-or-part-time: 15h
Theory classes: 6h
Self study : 9h

Tactic and strategic systems

Description:
Code Structure
Waypoints Markup
Tactical Pathfinding

Full-or-part-time: 15h
Theory classes: 6h
Self study : 9h

Learning systems

Description:
Reinforced Learning
Neural Networks
Genetic Algorithms

Full-or-part-time: 15h
Theory classes: 9h
Self study : 6h

AI game design

Description:
Shooters and 3rd person
Driving
RTS
RPGs & Turn Based

Full-or-part-time: 20h
Theory classes: 8h
Self study : 12h

GRADING SYSTEM

Final Exam 25% about all the knowledge of the entire subject.
First assignment about steering behaviors and pathfinding with a weight of 20%.
Second assignment about decision taking using behavior trees with a weight of 20%.
Third assignment about a playable demo that uses all the IA technologies explained with a weight of 25%.
A revaluation exam with the same weight as the final exam (40%).
Attitude and class participation will weight 10% of the final grade.

BIBLIOGRAPHY

Basic:
- Millington, Ian. AI for games . Third edition. Boca Raton : CRC Press, [2019]. ISBN 978-1-138-48397-2.