![ipb INSTITUTO POLITÉCNICO DE BRAGANÇA]

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| Course Unit | Game Theory | Field of study | Game Design | |
| Bachelor in | Game Design | School | School of Public Management, Communication and Tourism | |
| Academic Year | 2017/2018 | Year of study | 1 | Level | 1-1 | ECTS credits | 6.0 |
| Type | Semestral | Semester | 2 | Code | 8309-414-1205-00-17 |

| Workload (hours) | 162 | Contact hours | T | - | TP | 60 | PL | - | TC | - | S | - | E | - | OT | - | O | - |

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tuturial; O - Other

| Name(s) of lecturer(s) | Ines Monteiro Barbedo de Magalhaes, Jorge Miguel Ferrao Palinhos |

## Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Understand what is a game and what are the fundamental concepts associated with it;
2. Understand game theory as an interdisciplinary approach to the study of human behavior;
3. Understand and employ the principles of ludology and narratology;
4. Know the history of digital games and its relationship with other media;
5. Master the fundamental vocabulary of game design;
6. Apply theoretical concepts in the analysis of case studies and design of prototypes.

## Prerequisites

Before the course unit the learner is expected to be able to:
Not applicable.

## Course contents

MODULE 1: Definition and formal elements of a game. History and evolution of digital games. The (inter)disciplinary area of game studies. Fundamental vocabulary of game design. Introduction to GameMaker. MODULE 2: Decision theory and game theory. Simultaneous and sequencial games. Finite and infinite games. Sets of information. Game balance. Rational and/or aleatory decision. Strategies in finite and infinite games. JOINT WORKSHOPS: prototyping activities.

## Course contents (extended version)

1. Definition and formal elements of a game.
2. History and evolution of digital games.
3. The (inter)disciplinary area of game studies:
    - the four dimensions of analysis (game, player, culture, ontology);
    - some of the main authors;
    - methodologies.
4. Some fundamental debates:
    - narratology vs. ludology;
    - ethics and digital games;
    - games in specific contexts (serious games, persuasive games, alternative games);
    - media archeology.
5. Fundamental vocabulary of game design:
    - concept, gameplay, mechanics and game balance;
    - player-centric design;
    - prototyping and playtesting.
6. Digital game genres:
    - action;
    - strategy;
    - adventure;
    - role-playing;
    - sports;
    - vehicle simulation;
    - construction and management simulation;
    - life simulation;
    - puzzle.
7. Introduction to GameMaker.
8. Decision theory and game theory. Rationality. Preference relation and strategic interaction.
9. Simultaneus games and sequential games:
    - strategic form and extensive form;
    - actions set and strategy;
    - game and subgame;
10. Classic exemples of simultaneus games:
    - Prisioner's Dilemma;
    - Sex Battles;
    - Matching Pennies.
11. Finite and infinite games:
    - subgame;
    - Centipede game;
    - repeated simultaneus games.
12. Information sets:
    - perfect information and imperfect information;
    - complete and incomplete information.
13. Strategies analysis - game equilibrium:
    - dominant and dominated strategy;
    - the best decision and the Nash equilibrium: definition and exemples;
    - Pareto optimal;
    - backward induction in determination of subgame perfect equilirium;
    - rational decision and aleatory decision;
    - mixed strategies: strictly competitive games and non strictly competitive games;
    - Tigger (grim) strategy and Tit-for-tat strategy;
    - the promotion of cooperation.
14. Prototyping workshops.

## Recommended reading

1. Adams, E. & Rollings, A. (2007). Fundamentals of Game Design. New Jersey: Pearson / Prentice Hall. [ISBN: 9780131687479]
2. Donovan, T. (2010). Replay: the history of videogames. East Sussex: Yellow Ant. [ISBN: 9780956507204]
3. Osborne, M. (2004). An introduction to game theory. Oxford: Oxford University Press. [ISBN: 9780195128956]
4. Mark, D. (2009). Behavioral Mathematics for Game AI. USA: Cengage Learning. [9781584506843]
5. Perron, B. & Wolf, M. J. P. (eds. ) (2009). The Video Game Theory Reader 2. Nova Iorque & Londres: Routledge. [ISBN: 9780415962834]

## Teaching and learning methods

Contact Hours: Content exposition, with the aid of different audiovisual products. Questioning, in order to develop critical ability. Demonstrative method, with the aid of technical equipment. Active method, when the student solves exercises. Non-contact Hours: Active method, when the student solves proposed assignements.

## Assessment methods

1. DISTRIBUTED EVALUATION (mobility students) - (Regular, Student Worker) (Final)
    - Development Topics - 20% (Module 1: Presentation on the subjects of the Unit.
    (minimum mark 7/20))
    - Practical Work - 20% (Module 2: Resolution of two exercices with peer review
    (minimum mark 7/20))
    - Practical Work - 60% (Joint workshops: development of prototypes.
    (minimum mark 7/20))
2. DISTRIBUTED EVALUATION (mobility students) - (Regular, Student Worker) (Supplementary, Special)
    - Development Topics - 20% (Module 1: Essay about the topics of the module.
    (minimum mark 7/20))
    - Final Written Exam - 20% (Module 2: final test that covers all subjects of the module.
    (minimum mark 7/20))
    - Practical Work - 60% (Joint workshops: development of prototypes.
    (minimum mark 7/20))

## Language of instruction

1. Portuguese
2. English

## Electronic validation

| Ines Monteiro Barbedo de Magalhaes, Jorge Miguel Ferrao Palinhos | João Paulo Pereira de Sousa | Aida Maria Oliveira Carvalho | Luisa Margarida Barata Lopes |
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| 03-04-2018 | 03-04-2018 | 03-04-2018 | 05-04-2018 |