# [MNA002] MACHINE LEARNING

## GENERAL INFORMATION

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|---|---|---|---|---|---|
| **Studies** | MASTER DEGREE IN DATA ANALYSIS, CYBERSECURITY AND CLOUD COMPUTING | | | **Subject** | Data Analysis |
| **Semester** | 1 | **Course** | 1 | **Mention / Field of specialisation** | |
| **Character** | COMPULSORY | | | | |
| **Plan** | 2019 | **Modality** | Adapted Face-to-face | **Language** | ENGLISH |
| **Credits** | 3 | **Hours/week** | 0 | **Total hours** | 32 class hours + 43 non-class hours = **75 total hours** |

## PROFESSORS

IZAGIRRE AIZPITARTE, UNAI

## REQUIRED PREVIOUS KNOWLEDGE

| Subjects | Knowledge |
|---|---|
| *(No specific previous subjects required)* | *(No previous knowledge required)* |

## SKILLS

### VERIFICA SKILLS

**SPECIFIC**

**MNCE02** - Designing, developing and implementing pre-processing and data modelling techniques to predict, classify and group them, being able to interpret and validate the models created for the extraction of knowledge

**CROSS**

**MNCTR1** - Ability to work in multidisciplinary teams and in a multilingual environment (Basque/Spanish/English) and to communicate, both orally and in writing, knowledge, procedures, results and ideas related to the life cycle of the data, cybersecurity, and development and operations.

**BASIC**

**M_CB10** - To have learning skills and the capacity for self-guided or independent subsequent learning.

## LEARNING RESULTS

**RA121 The student recognizes and uses machine learning concepts to apply in data pre-processing**

| LEARNING ACTIVITIES | *CH* | *NCH* | *TH* |
|---|---|---|---|
| Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams | 2 h. | 3 h. | 5 h. |
| Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints | 1 h. | 3 h. | 4 h. |
| Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects | 4,5 h. | | 4,5 h. |
| Carrying out exercises and solving problems individually and/or in teams | 2,5 h. | 4 h. | 6,5 h. |

| EVALUATION SYSTEM | *W* |
|---|---|
| Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems | 15% |
| Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree project, master's thesis, challenges and problems | 25% |
| Individual written and/or oral tests or individual coding/programming tests | 60% |

**MAKE-UP MECHANISMS**

Individual written and/or oral tests or individual coding/programming tests

**CH - Class hours:** 10 h.
**NCH - Non-class hours:** 10 h.
**TH - Total hours:** 20 h.

**RA122 The student develops and proposes data analysis oriented solutions, individually and in groups, using the concepts of machine learning**

| LEARNING ACTIVITIES | *CH* | *NCH* | *TH* |
|---|---|---|---|
| Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams | 6 h. | 16 h. | 22 h. |
| Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints | 1 h. | 3 h. | 4 h. |
| Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects | 8,5 h. | | 8,5 h. |
| Carrying out exercises and solving problems individually and/or in teams | 6,5 h. | 14 h. | 20,5 h. |

| EVALUATION SYSTEM | *W* |
|---|---|
| Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems | 15% |
| Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree project, master's thesis, challenges and problems | 25% |
| Individual written and/or oral tests or individual coding/programming tests | 60% |

| MAKE-UP MECHANISMS |
|---|
| Individual written and/or oral tests or individual coding/programming tests |

**CH - Class hours:** 22 h.
**NCH - Non-class hours:** 33 h.
**TH - Total hours:** 55 h.

## CONTENTS

- Data preprocessing

* Cleansing

* Transformations

* Missing valoues and outliers

* Variable selection/extraction/discretization

* Imbalanced data treatment

- Data analysis

* Problem taxonomy: classification, regression and clustering

* Model families

* Model selection

* Model validation

## LEARNING RESOURCES AND BIBLIOGRAPHY

| Learning resources | Bibliography |
|---|---|
| Subject notes | http://katalogoa.mondragon.edu/janium-bin/janium_login_opac_re_link.pl?grupo=MASTERDATUANALISIA11&ejecuta=10& |
| Technical articles | |
| Topic related web quires | |
| Moodle Platform | |
| Class presentations | |
| Computer practical training | |
| Slides of the subject | |
| Specific Master Software | |