# [GOJ302] QUANTITATIVE METHODS FOR INDUSTRIAL ORGANISATION I

## GENERAL INFORMATION

| | | | | | |
|---|---|---|---|---|---|
| **Studies** | DEGREE IN INDUSTRIAL ORGANIZATION ENGINEERING | | | **Subject** | QUANTITATIVE METHODS |
| **Semester** | 2 | **Course** | 2 | **Mention / Field of specialisation** | |
| **Character** | COMPULSORY | | | | |
| **Plan** | 2022 | **Modality** | Face-to-face | **Language** | CASTELLANO/EUSKARA |
| **Credits** | 4,5 | **Hours/week** | 4.06 | **Total hours** | 73 class hours + 39.5 non-class hours = **112.5 total hours** |

## PROFESSORS

ELGUEZABAL LAZCANO, BORJA

## REQUIRED PREVIOUS KNOWLEDGE

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

## LEARNING RESULTS

| LEARNING RESULTS | KC | SK | AB | ECTS |
|---|---|---|---|---|
| **GOR211** - To apply modeling and optimization techniques to linear problems | | x | | 4,02 |
| **G-RTR1** - To develop interdisciplinary projects specific to their specialty and of gradual complexity, - becoming aware of respect for human rights and fundamental rights, and analyzing and assessing the impact of the proposed solutions on the SDGs - to acquire and/or apply basic, advanced and /or avant-garde, demonstrating the ability to work in multidisciplinary teams and/or undertake further studies with a high degree of autonomy | | x | | 0,24 |
| **G-RTR2** - To express information, ideas and the arguments that support them in an orderly, clear and coherent manner, orally and in writing, based on quality information, self-made or obtained from different sources, using inclusive and non-discriminatory language | | x | | 0,24 |
| | | | **Total:** | 4,5 |

*KC: Knowledge or Content / SK: Skills / AB: Abilities*

| ENAEE LEARNING RESULTS | ECTS |
|---|---|
| **ENAE02** - Knowledge and understanding: A systematic understanding of the key aspects and concepts of their branch of engineering. | 1,76 |
| **ENAE03** - Knowledge and understanding: Sufficient knowledge of their branch of engineering, including some knowledge at the forefront of their field. | 0,6 |
| **ENAE04** - Knowledge and understanding: To be aware of the multidisciplinary context of engineering. | 0,24 |
| **ENAE05** - Analysis in engineering: Ability to apply their knowledge and understanding in identifying, formulating and solving engineering problems using established methods. | 0,4 |
| **ENAE07** - Analysis in engineering: Ability to choose and apply relevant modelling and analytical methods. | 0,16 |
| **ENAE08** - Engineering projects: Ability to apply their knowledge in the development and completion of projects which meet specific requirements. | 0,22 |
| **ENAE12** - Research & innovation: Technical and lab competences. | 0,16 |
| **ENAE13** - Practical application of engineering: Ability to select and use suitable equipment, tools and methods. | 0,16 |
| **ENAE15** - Practical application of engineering: Understanding of applicable methods and techniques and their limitations. | 0,16 |
| **ENAE17** - Transversal competences: To work effectively, both individually and in a team. | 0,22 |
| **ENAE18** - Transversal competences: To use different methods to communicate effectively with the engineering community and society in general. | 0,22 |
| **ENAE19** - Transversal competences: Demonstrate that they are aware of the responsibility implied in the practical application of engineering, the social and environmental impact, and show commitment with professional ethics, responsibility and regulations of the practical application of engineering. | 0,22 |
| **Total:** | 4,5 |

## SECONDARY LEARNING RESULTS

**RGO290** **[!]** ***Proponer los objetivos y la planificación de un proyecto que le permita adquirir y/o reforzar los conocimientos de tecnologías propias de su especialidad,- que en ocasiones llegan a la vanguardia del conocimiento- y definir una estrategia de aprendiz***

| 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. | 1 h. | 3 h. |

| EVALUATION SYSTEM | W | MAKE-UP MECHANISMS |
|---|---|---|
| Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems | 100% | *(No mechanisms)* |

**CH - Class hours:** 2 h.
**NCH - Non-class hours:** 1 h.
**TH - Total hours:** 3 h.

**RGO291** **[!]** ***Establecer las responsabilidades de los miembros del equipo utilizando técnicas adecuadas para fomentar la eficiencia del equipo para el desarrollo del proyecto en los plazos establecidos (compartir recursos, aportar ideas, habilidades comunicativas***

| 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. | 1 h. | 3 h. |

| EVALUATION SYSTEM | W | MAKE-UP MECHANISMS |
|---|---|---|
| Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems | 100% | *(No mechanisms)* |

**CH - Class hours:** 2 h.
**NCH - Non-class hours:** 1 h.
**TH - Total hours:** 3 h.

**RGO293** **[!]** ***Redacta y estructura correctamente la memoria del proyecto, haciendo un uso correcto, inclusivo y no discriminatorio del lenguaje. Para ello, busca y hace uso de las fuentes de información adecuadas.***

| 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. | 1 h. | 3 h. |

| EVALUATION SYSTEM | W | MAKE-UP MECHANISMS |
|---|---|---|
| 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 | 100% | *(No mechanisms)* |

**CH - Class hours:** 2 h.
**NCH - Non-class hours:** 1 h.
**TH - Total hours:** 3 h.

**RGO294** **[!]** ***Realiza una presentación oral del proyecto con argumentos elaborados por sí mismos y haciendo un uso correcto, inclusivo y no discriminatorio del lenguaje.***

| 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. | 1 h. | 3 h. |

| EVALUATION SYSTEM | W | MAKE-UP MECHANISMS |
|---|---|---|
| Reports on the completion of exercises, case studies, | 100% | *(No mechanisms)* |

computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

**CH - Class hours:** 2 h.
**NCH - Non-class hours:** 1 h.
**TH - Total hours:** 3 h.

**RGO223** **[!]** ***Modeliza problemas lineales de optimización***

| 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 | 3 h. | 2 h. | 5 h. |
| Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints | 1 h. | 4 h. | 5 h. |
| Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects | 10 h. | 2 h. | 12 h. |
| Carrying out exercises and solving problems individually and/or in teams | 1 h. | 2 h. | 3 h. |

| EVALUATION SYSTEM | W | MAKE-UP MECHANISMS |
|---|---|---|
| Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems | 30% | Individual written and/or oral tests or individual coding/programming tests |
| Individual written and/or oral tests or individual coding/programming tests | 70% | |

**CH - Class hours:** 15 h.
**NCH - Non-class hours:** 10 h.
**TH - Total hours:** 25 h.

**RGO224** **[!]** ***Aplica técnicas de resolución de problemas lineales de optimización***

| 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 | 3 h. | 4 h. | 7 h. |
| Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints | 2 h. | 4 h. | 6 h. |
| Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects | 25 h. | 12 h. | 37 h. |
| Carrying out exercises and solving problems individually and/or in teams | 20 h. | 5,5 h. | 25,5 h. |

| EVALUATION SYSTEM | W | MAKE-UP MECHANISMS |
|---|---|---|
| Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems | 30% | Individual written and/or oral tests or individual coding/programming tests |
| Individual written and/or oral tests or individual coding/programming tests | 70% | |

**CH - Class hours:** 50 h.
**NCH - Non-class hours:** 25,5 h.
**TH - Total hours:** 75,5 h.

## CONTENTS

1. INTRODUCTION

2. LINEAR MODELS
3. GRAPHICAL METHOD
4. SIMPLEX METHOD
5. SIMPLEX-DUAL METHOD
6. SENSITIVITY STUDY

## LEARNING RESOURCES AND BIBLIOGRAPHY

| Learning resources | Bibliography |
|---|---|
| Subject notes | Optimizazioa. Programazio Lineala. Victoria Fernández González, Ana Zelaia Jauregui. Argitaletxea: UEU. |
| Topic related web quires | Investigación operativa. Optimización. Sixto Ríos Insua. Argitaletxea: Centro de estudios Ramón Areces, S. A. |
| Moodle Platform | Métodos Cuantitativos de Organización Industrial I. J.M. Sallán, A. Suñé, V. Fernández, J.B. Fonollosa |
| Class presentations | Introducción a la investigación de operaciones. Frederick S. Hillier, Gerald J. Lieberman. Argitaletxea: McGraw Hill. |
| Programmes | Investigación de operaciones. Una introducción. Hamdy A. Taha. Argitaletxea: Prentice Hall. |
| Slides of the subject | Investigación de operaciones. El arte de la toma de decisiones. Daniel Solow, Kamlesh Mathur. Argitaletxea: Prentice Hall. |
| | Investigación Operativa. Quintín Martín. Argitaletxea: Pearson, Prentice may |
| | La investigación operativa. Angel Sarabia Viejo. Argitaletxea: UPCO-Madrid. |