# [GMB301] PHYSICS I

## GENERAL INFORMATION

| | | | | | |
|---|---|---|---|---|---|
| **Studies** | DEGREE IN MECHANICAL ENGINEERING | | | **Subject** | PHYSICS |
| **Semester** | 1 | **Course** | 1 | **Mention / Field of specialisation** | |
| **Character** | BASIC TRAINING | | | | |
| **Plan** | 2022 | **Modality** | Face-to-face | **Language** | EUSKARA |
| **Credits** | 6 | **Hours/week** | 5 | **Total hours** | 90 class hours + 60 non-class hours = **150 total hours** |

## PROFESSORS

EZKURRA MAYOR, MIKEL
IRAGUI SAN PEDRO, MIKEL
TELLERIA ARIZTIMUÑO, XUBAN

## REQUIRED PREVIOUS KNOWLEDGE

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

## LEARNING RESULTS

| LEARNING RESULTS | KC | SK | AB | ECTS |
|---|---|---|---|---|
| **G-RA03** - To understand and master the basic concepts of the general laws of mechanics, and their application to solve engineering problems | | x | | 5,4 |
| **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 | | 0,28 |
| **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 | | 0,32 |
| | | | **Total:** | 6 |

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

### ENAEE LEARNING RESULTS

**ENA101** - Knowledge and comprehension: Knowledge and understanding of mathematics and other basic sciences inherent in them engineering speciality, at a level that allows them to acquire the other competencies of the degree.

**ENA104** - Analysis in engineering: The ability to analyse complex products, processes and systems in their field of study; choose and apply relevant analytical, calculation and experimental methods in a suitable way; and correctly interpret the results of such analyses.

**ENA106** - Engineering projects: Ability to project, design and develop complex products (parts, components, finished products, etc.), processes and systems of their speciality, which meet the established requirements, including awareness of the social, health and safety, environmental, economic and industrial aspects, as well as selecting and applying appropriate project methods.

**ENA113** - Practical application of engineering: Knowledge of application of materials, equipment and tools, engineering technology and processes, and their limitations in the field of their speciality.

**ENA119** - Communication and Teamwork: Ability to effectively communicate information, ideas, problems and solutions in the field of engineering and with society in general.

**ENA120** - Communication and Teamwork: Ability to operate effectively in domestic and international contexts, individually and as a team, and to cooperate with both engineers and people from other disciplines.

## SECONDARY LEARNING RESULTS

**RGM105** **[!]** ***Modelizar, calcular y examinar el equilibrio estático de los sólidos***

| 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 | 5 h. | 3 h. | 8 h. |
| Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints | 2 h. | | 2 h. |
| Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects | 15 h. | | 15 h. |
| Carrying out exercises and solving problems individually and/or in teams | 5 h. | 11 h. | 16 h. |
| Self-assessment tests in a context of autonomous and continuous learning | | 4 h. | 4 h. |

| EVALUATION SYSTEM | W | MAKE-UP MECHANISMS |
|---|---|---|
| Reports on the completion of exercises, case studies, | 20% | Individual written and/or oral tests or individual |

| | | |
|---|---|---|
| computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems | | coding/programming tests |
| Individual written and/or oral tests or individual coding/programming tests | 80% | |

**CH - Class hours:** 27 h.
**NCH - Non-class hours:** 18 h.
**TH - Total hours:** 45 h.

**RGM106** **[!]** ***Identifica, calcula y analiza el movimiento de partículas y sólidos, así como los sistemas de fuerza necesarios para producirlos***

| 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 | 10 h. | 6 h. | 16 h. |
| Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints | 4 h. | | 4 h. |
| Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects | 30 h. | | 30 h. |
| Carrying out exercises and solving problems individually and/or in teams | 10 h. | 22 h. | 32 h. |
| Self-assessment tests in a context of autonomous and continuous learning | | 8 h. | 8 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 | 20% | Individual written and/or oral tests or individual coding/programming tests |
| Individual written and/or oral tests or individual coding/programming tests | 80% | |

**CH - Class hours:** 54 h.
**NCH - Non-class hours:** 36 h.
**TH - Total hours:** 90 h.

**RGM190** **[!]** ***Conocer y aplicar las fases para desarrollar de forma guiada, con los objetivos y la planificación previamente definidos, un proyecto de complejidad técnica acorde con los conocimientos de formación básica de la ingeniería. Reflexiona sobre los cono***

| 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. | 1 h. | 4 h. |

| EVALUATION SYSTEM | W | MAKE-UP MECHANISMS |
|---|---|---|
| Observation (technical capacity, attitude and participation) | 100% | *(No mechanisms)* |

**CH - Class hours:** 3 h.
**NCH - Non-class hours:** 1 h.
**TH - Total hours:** 4 h.

**RGM191** **[!]** ***Contribuir en la estrategia de funcionamiento del equipo priorizando los objetivos comunes, fomentando y valorando la participación de todas las personas y responsabilizándose de las tareas individuales, así como del cumplimiento de plazos.***

| 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 |
|---|---|
| Self-assessment | 33% |
| Co-assessment | 34% |
| Observation (technical capacity, attitude and participation) | 33% |

**MAKE-UP MECHANISMS**

*(No mechanisms)*

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

**RGM193** **[!]** ***Redacta una memoria de proyecto clara y concisa utilizando las fuentes de información y estructura de memoria facilitadas, 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. | 2 h. | 4 h. |

| EVALUATION SYSTEM | W |
|---|---|
| Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems | 100% |

**MAKE-UP MECHANISMS**

*(No mechanisms)*

**CH - Class hours:** 2 h.
**NCH - Non-class hours:** 2 h.
**TH - Total hours:** 4 h.

**RGM194** **[!]** ***Realiza una presentación oral y defensa del proyecto clara y concisa, haciendo 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. | 2 h. | 4 h. |

| EVALUATION SYSTEM | W |
|---|---|
| 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% |

**MAKE-UP MECHANISMS**

*(No mechanisms)*

**CH - Class hours:** 2 h.
**NCH - Non-class hours:** 2 h.
**TH - Total hours:** 4 h.

## CONTENTS

**1. STATICS**

1.1. Forces and moments  Forces and components  Moments. Moment of a couple1.2 Newton's laws  Equilibrium of a particle  Equilibrium of a rigid body1.3. Free body diagrams in 2D and 3D  Isolating a mechanical system  Constraints  Contact forces: normal and friction1.4. Centroid. Center of mass. Center of gravity. Distributed forces

**2. KINEMATICS**2.1. Motion in one dimension of a particle

Position, speed and acceleration2.2. Motion in two dimensions of a particle Tangential and normal components2.3. Case studies: parabolic motion and circular motion2.4. Motion of connected particles

**3. KINETICS**
3.1. Kinetics of particles. Newton's 2nd law3.2. Kinetics of rigid solids. Newton's 2nd law3.3. Kinetics of particles. Energy methods3.4. Kinetics of rigid solids. Energy methods

## LEARNING RESOURCES AND BIBLIOGRAPHY

| Learning resources | Bibliography |
|---|---|
| Moodle Platform<br>Class presentations<br>Subject notes<br>Slides of the subject | https://katalogoa.mondragon.edu/janium-bin/sumario.pl?Id=20230919120116 |