# SUBJECT TEACHING GUIDE

## M1629 - Fluid mechanics and heat transmission

## Master's Degree in mining engineering

Academic year 2022-2023

| 1. IDENTIFYING DATA | | | | | |
|---|---|---|---|---|---|
| Degree | Master's Degree in mining engineering | | | Type and Year | Compulsory. Year 1 |
| Faculty | School of Mines and Energy Engineering | | | | |
| Discipline | SCIENTIFIC EXPANSION | | | | |
| Course unit title and code | M1629 - Fluid mechanics and heat transmission | | | | |
| Number of ECTS credits allocated | 4,5 | Term | | Semester based (1) | |
| Web | | | | | |
| Language of instruction | Spanish | English Friendly | Yes | Mode of delivery | Face-to-face |

| | |
|---|---|
| Department | DPTO. INGENIERIA ELECTRICA Y ENERGETICA |
| Name of lecturer | PABLO BERNARDO CASTRO ALONSO |
| E-mail | pablo.castro@unican.es |
| Office | E.P. de Ingeniería de Minas y Energía. Planta: + 0. DESPACHO SUBDIRECCION 059 (059) |
| Other lecturers | JOSE SALMON GARCIA |

| 3.1 LEARNING OUTCOMES |
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| - Specialized understanding and resolution of problems in fluid mechanics and heat transfer. |

| 4. OBJECTIVES |
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| Understanding the physical principles and mathematical tools for the study of fluid mechanics and heat transfer |
| Solve specific problems of fluid mechanics. |
| Formulate and solve complex problems of heat transfer by conduction, convection and radiation. |

## 6. COURSE ORGANIZATION

| | CONTENTS |
|---|---|
| 1 | PART I: CONDUCTION HEAT TRANSFER<br>I.1. steady state conduction.<br>I.2. extended surfaces. |
| 2 | PART II: CONVECTION HEAT TRANSFER<br>II.1. Introduction to convection. Natural and forced convection<br>II.2. Heat exchangers |
| 3 | PART III: RADIATION HEAT TRANSFER<br>III.1. Radiation: processes and properties.<br>III.2. Radiation exchange between surfaces. |
| 4 | PART IV: NUMERICAL HEAT TRANSFER<br>IV.1. Numerical Methods in Heat Conduction.<br>IV.2. Numerical Heat Transfer Software. |
| 5 | PART V: DIMENSIONAL ANALYSIS AND SIMILARITY<br>V.1. Buckingham pi theorem.<br>V.2. Common dimensionless parameters. |
| 6 | PART VI: BOUNDARY LAYER<br>VI.1. Introduction.<br>VI.2. laminar and turbulent boundary layer on flat plate.<br>VI.3. Thickness and boundary layer flow. |
| 7 | PART VII: HOLES AND LANDFILLS<br>VII.1. Classification.<br>VII.2 Spending coefficient.<br>VII.3. Holes and thin and thick wall landfills. |

## 7. ASSESSMENT METHODS AND CRITERIA

| Description | Type | Final Eval. | Reassessn | % |
|---|---|---|---|---|
| practical and theoretical exercises | Others | No | Yes | 30,00 |
| Final exam | Written exam | Yes | Yes | 35,00 |
| Mid-term exam | Written exam | Yes | Yes | 35,00 |
| TOTAL | | | | 100,00 |

**Observations**

In case of not reaching the minimum score asigned to the exams, the final mark will be the lower value between 4,9 and the average score.

**Observations for part-time students**

Part-time students will take a final exam over 100% of the total score.

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

**BASIC**

Mecánica de fluidos aplicada; R. MOTT; ED. PRENTICE HALL

Fundamentos de Transferencia de Calor y de Masa; F. INCROPERA, D. DEWITT; ED. PEARSON EDUCACION