

SUBJECT TEACHING GUIDE

1128 - Fluid mechanics and heat transmission

Master's Degree in mining engineering

Master's Degree in mining engineering

Academic year 2023-2024

| 1. IDENTIFYING DATA | | | | | |
|----------------------------------|--|------------------|--------------------|------------------|--|
| Degree | Master's Degree in mining engineering Master's Degree in mining engineering | | | Type and Year | Compulsory. Year 1 Compulsory. Year 1 |
| Faculty | School of Mines and Energy Engineering | | | | |
| Discipline | SCIENTIFIC EXPANSION | | | | |
| Course unit title and code | 1128 - Fluid mechanics and heat transmission | | | | |
| Number of ECTS credits allocated | 4,5 | Term | Semester based (1) | | |
| Knowledge Field | | | | | |
| Web | | | | | |
| Language of instruction | Spanish | English Friendly | Yes | Mode of delivery | Face-to-face |

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|------------------|---|--|--|--|--|
| 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 | | | | |

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

