# [MHF202] SOLIDIFICATION PROCESSING OF METALS

## GENERAL INFORMATION

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|---|---|---|---|---|---|
| **Studies** | UNIVERSITY MASTER IN INDUSTRIAL ENGINEERING | | | **Subject** | ? |
| **Semester** | 1 | **Course** | 1 | **Mention / Field of specialisation** | ??? |
| **Character** | OPTIONAL | | | | |
| **Plan** | 2022 | **Modality** | Face-to-face | **Language** | ENGLISH |
| **Credits** | 3 | **Hours/week** | 1.89 | **Total hours** | [!] 34 class hours + 41 non-class hours = **75 total hours** |

## PROFESSORS

BERNAL RODRIGUEZ, DANIEL
GARCIA MICHELENA, PABLO

## REQUIRED PREVIOUS KNOWLEDGE

| Subjects | Knowledge |
|---|---|
| *(No specific previous subjects required)* | Materials Science Fundamentals |
| | Knowledge of 3D design tools |

## LEARNING RESULTS

| LEARNING RESULTS | KC | SK | AB | ECTS |
|---|---|---|---|---|
| **MHMP01** - To project, calculate and design integrated manufacturing systems, optimizing the most suitable manufacturing processes for different industrial sectors, based on their material and design, identifying the machinery to be used, the parameters to control and establishing the designs of the tools to be used. | | x | | 1,68 |
| **MHMP02** - To project, calculate and design integrated manufacturing systems taking into account the performance of polymeric, metallic, composite and biomaterial materials and be able to establish the relationship between properties-microstructure-processing | | x | | 0,2 |
| **MHRA04** - To analyze and design chemical processes | | x | | 0,4 |
| **MHRA27** - To demonstrate the ability to integrate knowledge and face the complexity of formulating judgments based on information that, being incomplete or limited, includes reflections on the social, health and safety, environmental, economic and industrial implications and responsibilities | | x | | 0,08 |
| **MHRA28** - To communicate your conclusions and the knowledge and ultimate reasons that support them to specialized and non-specialized audiences in a clear and unambiguous way | | x | | 0,04 |
| **MHRA30** - To work with people, involving and directing them in a dynamic aimed at a common objective that includes reflection on their ethical and social responsibility, with a global vision of the work to be carried out and the characteristics that it requires (quality, deadlines,... ), assuming responsibility for the decisions made | | x | | 0,08 |
| **MHR125** - To possess and understand knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context | | x | | 0,2 |
| **MHR126** - To apply the knowledge acquired and your problem-solving skills in new, little-known or changing environments within broader (or multidisciplinary) contexts related to your area of study | | x | | 0,16 |
| **MHR129** - To possess the learning skills that allow them to continue studying in a way that will be largely self-directed or autonomous | | x | | 0,16 |
| | | | **Total:** | 3 |

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

| ENAEE LEARNING RESULTS | ECTS |
|---|---|
| **ENA124** - Knowledge and comprehension: Deep knowledge and comprehension of the engineering disciplines of their speciality, at the level necessary to acquire the rest of the competencies of the degree. | 0,3 |
| **ENA128** - Analysis in engineering: Ability to conceive new products, processes, and systems. | 0,36 |
| **ENA133** - Research and innovation: Ability to identify, find and obtain the required data. | 0,3 |
| **ENA134** - Research and innovation: Ability to carry out bibliographic searches and consult and use databases and other information sources with discretion, in order to carry out simulations with the aim of conducting research on complex topics of their speciality. | 0,3 |
| **ENA136** - Research and innovation: High-level capacity and ability to project and carry out experimental investigations, interpret data with criteria, and draw conclusions. | 0,18 |
| **ENA137** - Research and innovation: Ability to investigate the application of the most advanced technologies in their speciality. | 0,36 |
| **ENA139** - Practical application of engineering: Practical skills, such as the use of computer tools to solve complex problems, carry out complex engineering projects, and design and guide complex investigations. | 0,36 |
| **ENA140** - Practical application of engineering: Complete knowledge of application of materials, equipment and tools, engineering technology and processes, and their limitations. | 0,48 |
| **ENA146** - Communication and Teamwork: Ability to employ different methods to communicate their conclusions, clearly and unambiguously, and the knowledge and logical foundations that support them, to audiences specialised and not specialised in the issue, in domestic and international contexts. | 0,36 |
| **Total:** | 3 |

## CONTENTS

1. Metallurgical quality2. Solidification3. Sands4. Defectology5. Liquid metal treatment6. CFD basics7. Feeding system design8. Material selection

9. Pre-processing/model design/post-processing, casting simulations

## LEARNING RESOURCES AND BIBLIOGRAPHY

| Learning resources | Bibliography |
|---|---|
| Technical articles | Serope Kalpakjian, Steven R. Schmid. Manufactura Ingeniería y tecnología, Pearson Educación, México, 2002 |
| Topic related web quires | John Campbell. Introduction to Casting Practice: The 10 Rules of Castings, Complete Casting Handbook, Elsevier, 2004 |
| Moodle Platform | |
| Class presentations | |
| Computer practical training | |
| Specific Master Software | |
| Slides of the subject | |