

<b>POLI</b> ESCOLA SUPERIOR TECNOLOGIA GESTÃO <b>TÉCNICO</b> <b>GUARDA</b>	<b>SUBJECT DESCRIPTION</b>	<b>MODELO</b> PED.013.03
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Course	Energy and Environment					
Subject	Fluids and Heat Transfer					
Academic year	2023-2024	Curricular year	2nd	Study period	1st semester	
Type of subject	Compulsory	Student workload (H)	Total: 154	Contact: 60	ECTS	5,5
Professor(s)	Rui Pitarma					
<input checked="" type="checkbox"/> Area/Group Coordinator <input type="checkbox"/> Head of Department	(select)	Rui Pitarma (PhD)				

## PLANNED SUBJECT DESCRIPTION

### 1. LEARNING OBJECTIVES

Acquire the basic fundamental knowledge of Fluid Mechanics and Heat Transfer. Analyse and solve problems involving fluid flows, transformations and mass and energy transfer through a suitable compromise between theory and practice. Become aware of the importance of the fluid and heat transfer phenomena in the industry and the importance of operating the equipment, systems and processes efficiently, ensuring efficient use of energy and natural resources, keeping in mind the energy and environmental problems. Acquire the basis to become prepared for learning subsequent subjects.

### 2. PROGRAMME

1. Introduction and properties of fluids; 2. Basics of fluid statics; 3. Basics of fluid flow; 4. Practical applications of basic equations of static and fluid dynamics 5. Similitude and dimensional analysis; Notes of CFD applications; 7. Basics of turbomachinery; 8. Principles of heat transfer (conduction and convection); 9. Principles of thermal radiation. 10. Practical applications of heat transfer.

### 3. COHERENCE BETWEEN PROGRAMME AND OBJECTIVES

Chapters 1, 2, 3, 4, 8, and 9 are intended to achieve the main objective of the subject, i.e., provide students with the basic knowledge of fluid mechanics and heat transfer. Chapters 5, 6, 7 and 10 intend to achieve the complementary objective of studying practical applications of the fundamental laws of fluid mechanics and heat transfer, as well as integrating the knowledge acquired to identify, understand and solve a number of engineering problems with practical relevance.

### 4. MAIN BIBLIOGRAPHY

- White, Frank M., *Mecânica dos Fluidos*, McGraw-Hill, 2011. ISBN: 0072938447/9780072938449
- Oliveira, Luís Adriano e Gameiro, António Lopes, *Mecânica dos Fluidos*, ETEP - Edições Técnicas e Profissionais, 2010. ISBN: 9789728480288 (Distribuído por Lidel - Edições Técnicas, Lda)
- Kaminski, Deborah A. and Jensen, Michael K., *Introduction to Thermal and Fluid Engineering*, Wiley, 2017. ISBN-10 : 9781119289685; ISBN-13 : 978-1119289685
- Incropera, Frank P., Bergman, T. L., Lavine, A. e DeWitt, David P., *Fundamentos de Transferência de Calor e e Massa*, 7ª ed.; Editora LTC, 2013. ISBN 13: 9788521625049
- Pitarma, R.A., *Mecânica de Fluidos*, IPG. (teacher's notes)

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## 5. TEACHING METHODOLOGIES (INCLUDING EVALUATION)

*Lectures using audiovisual media, case studies, problem-solving, laboratory assignments and demonstrations. In the classes, theoretical, practical and laboratory dimensions are combined, encouraging participation, debate and individual/group reflection. Many educational media are used: schemas in tables, multimedia presentations, videos and lab activities. In tutorial orientation sessions, the students' questions and suggested studying methods will be analysed and clarified.*

*Ongoing evaluation: 10% Attendance, ≤20% Practical work, ≥80% Final Test (minimum grade required on final test = 8 out of 20).*

## 6. COHERENCE BETWEEN TEACHING METHODOLOGIES AND OBJECTIVES

*The main objective is globally achieved with the following methodologies: lectures, interactive lessons and laboratory sessions.*

*The complementary objective is achieved through laboratory sessions, problem-solving and case studies encouraging individual/group discussion and debate.*

## 7. ATTENDANCE

*Attendance is strongly recommended, but there is no mandatory minimum to be observed by students.*

## 8. CONTACTS AND OFFICE HOURS

*E-mail: [rpitarma@ipg.pt](mailto:rpitarma@ipg.pt);*

*Office: 14; Laboratory: Air conditioning and Environment.*

*Doubts and questions should be clarified during tutorial hours or service hours.*

## DATE

**13 de novembro de 2023**

## SIGNATURES

Professor and Area/Group Coordinator

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(signature)