Emanuele D'Alessio

EDUCATION AND TRAINING

[11/2023 – Current]

PhD in Energy and Environment

Università La Sapienza   https://www.uniroma1.it/it/pagina-strutturale/home

City: Roma | **Country:** Italy | **Field(s) of study:** Hydrogen Fuel Cell

Development of a comprehensive multiphysics model for the design and optimization of high- temperature PEM fuel cell stack geometry.

CFD, multiphysics modeling, and design and optimization of PEM fuel cells.

[01/06/2025 – Current]

Green Hydrogen Fellow

DAAD German Academic Exchange Services

City: Bayreuth | **Country:** Germany |

Computational modeling using DNS of innovative PEM fuel cell designs to enhance efficiency and

performance

[10/2024 – 10/2024]

Bioenergy and New Biofuels for Sustainable Future – Advanced training school ENEA

ENEA, University of Pisa, and AIDIC   https://www.eventi.enea.it/tutti-gli-eventi-enea/eventi-enea/ primo-piano/save-the-date-1-bioenergy-school.html

City: Research Centre ENEA Trisaia | **Country:** Italy |

Advanced training school organized by ENEA, University of Pisa, and AIDIC on renewable fuel

production technologies

[02/2024 – 02/2024]

Research Stay

University of Bayreuth   https://www.tms.uni-bayreuth.de/en/

City: Bayreuth | **Country:** Germany | **Field(s) of study:** CFD

Research stay at the University of Bayreuth to design and simulate, via DNS, a jet-impingement- based bipolar plate for HT-PEM fuel cells in collaboration with Prof. Sesterhenn.

[02/2022 – 10/2023]

MSc in Mechanical Engineering

Università La Sapienza   https://www.uniroma1.it/it/pagina-strutturale/home

City: Roma | **Country:** Italy | **Field(s) of study:** Energy Systems | **Final grade:** 110L | **Thesis:** 3D Numerical Modeling of a PEM Fuel Cell: A Multiphysics Approach Using CFD

"Excellent Graduate" Award (Premio "Laureato Eccellente") | June 2025

Courses: Fluid Machinery, Advanced Energy Systems, Turbulence and Combustion, Turbomachinery, CFD, FEM Design

[09/2018 – 12/2021]

BSc in Mechanical Engineering

Università La Sapienza   https://www.uniroma1.it/it/pagina-strutturale/home

City: Roma | **Country:** Italy | | **Final grade:** 104 | **Thesis:** Finite Difference Method for Fluid Dynamics Problems

Courses: Fluid Dynamics, Solid Mechanics, Energy Systems, Metallurgy, Thermophysics, Industrial Plants, Mechanical Design

[09/2013 – 06/2018] **Classical High School Diploma**

Liceo Classico Statale E. Q. Visconti https://www.liceoeqvisconti.it

City: Roma | **Country:** Italy |

WORK EXPERIENCE

Università di Roma - La Sapienza

City: Roma | **Country:** Italy

[09/2025 – Current] **University teaching assistant - Advanced Energy Conversion Systems**

Supporting the M.Sc. in Energy and Mechanical Engineering by providing didactic assistance and leading practical training sessions. I guide students in designing and sizing advanced energy systems—including wind, solar, CSP, fuel cells, electrolyzers, biomass, and Stirling engines—through hands-on projects in Python.

[09/2025 – Current] **University teaching assistant - Analisi Matematica 1**

Led practical exercise sessions for Electrical Engineering students, focusing on solving problems in differential calculus, integral calculus, and series to build a strong analytical foundation.

[02/2024 – 06/2025] **University teaching assistant - Fluid Machinery**

Guiding engineering students in the thermo-fluid dynamics and design of energy conversion machines. I led practical exercise sessions focused on applying theoretical concepts of turbomachinery (turbines, pumps, compressors) and positive displacement machines to solve complex engineering problems.

Franz

City: Roma | **Country:** Italy

[08/2018 – 09/2025] **Rider**

- Home delivery
- Took customer orders and coordinated riders

City: Roma | **Country:** Italy

[09/2018 – 11/2023] **Private Tutor**

Private tutoring in mathematics (Calculus I & II, Linear Algebra, Euclidean Geometry, Arithmetic) and physics (Dynamics, Electromagnetism, Optics, Solid and Fluid Mechanics)

Sapienza Flight Team

City: Roma | **Country:** Italy

[07/2022 – 05/2023] **Team Leader**

• Project management: Development of a fixed-wing autonomous drone for participation in the SUAS Competition (Student Unmanned Aerial Systems Competition)

• Management of departments: Software, Hardware, Computer Vision, Operations & Logistics, Design & Aerodynamics

[09/2021 – 07/2022] **Leader Software Subteam**

• Development and validation of the autopilot for a fixed-wing drone using Matlab/ Simulink

• Flight test management and telemetry data analysis

• Development and testing of sensor drivers

CONFERENCES AND SEMINARS

[16/09/2025 – 19/09/2025] **European Fuel Cells and Hydrogen - EFC2025**   Capri, Napoli

International conference focused on hydrogen technologies, fuel cells, and their applications across energy and industry.

[21/07/2025 – 25/07/2025] **11th International Symposium on Turbulence, Heat and Mass Transfer (THMT'25)**   Tokyo, Japan

International symposium on turbulence, heat and mass transfer, covering advanced experiments, simulations, and applications in energy and environmental technologies.

[04/09/2024 – 06/09/2024] **Powering the future Innovation and sustainable development for industry, communities, and sports**   University of Genova, Italy

79th Annual Congress of the Italian Thermotechnical Association (ATI)

[16/07/2024 – 17/07/2024] **POR H2 – National Hydrogen Research Event**   Rome, Italy

National conference organized by ENEA, RSE, and CNR on the Italian Hydrogen Research Plan, focusing on hydrogen technologies, infrastructure, and collaboration among research institutions and universities.

[06/03/2024 – 08/03/2024] **Machine Learning for Fluid Dynamics**   Sorbonne Université - Faculté des Sciences et Ingénierie Campus Pierre et Marie Curie, Paris France

PUBLICATIONS

[2025] **Flow Field Optimization for HTPEM Fuel Cells: A Comparative Study of Serpentine-Parallel and Wavy Flow Channels**

Reference: E. D'Alessio et al 2025 THMT-25 Turbulence, Heat and Mass Transfer proceeding
Journal Name: THMT-25 Turbulence, Heat and Mass Transfer | **Volume, Issue and Pages**: 10.1615/THMT-25 | **Publisher**: 978-1-56700-553-0

[2024] **Accuracy estimation of a CFD multiphysics approach to study mixed parallel-serpentine channels PEM**

Reference: Emanuele D'Alessio et al 2024 J. Phys.: Conf. Ser. 2893 012076

Multiphysics CFD numerical study of a PEM fuel cell (50 cm2), experimentally validated: optimization of electrochemical parameters and analysis of thermo-fluid dynamic interactions.

HONOURS AND AWARDS

[06/2025] **"Excellent Graduate" Award (Premio "Laureato Eccellente") Awarding institution:** University of Rome - La Sapienza

Official recognition awarded to a select group of top-performing graduates for outstanding academic achievement in the 2022-2023 academic year. The formal ceremony was held in the presence of the University Rector and high-level institutional representatives.

PROJECTS

[09/2022 – 01/2023] **Computational fluid mechanics analysis of a wind turbine blade**

Group project for the course "Computational Thermo-Fluid Analysis in Fluid Machinery". The project involved the analysis of the aerodynamic performance of an eroded wind turbine blade profile and comparison with the performance of the nominal (non-eroded) profile.

[09/2022 – 01/2023] **Preliminary design of a sCO2 axial turbine**

Group project for the "Fluid Machinery" course. We designed an axial turbine operating with supercritical CO2 for a Brayton cycle. The design process involved the careful selection of the most suitable machine for the given inlet conditions and concluded with the creation of the turbine's CAD model. The final outcome was a three-stage machine, whose design process was carried out using Python.

[02/2022 – 06/2022] **Modelling and simulation of turbulent processes**

Group project for the laboratory on turbulent processes. We used Julia software to analyze a 3D turbulent flow through the study of the invariants of the Reynolds stress tensor and the Q-criterion. The project was supervised by Prof. Joern Sesterhenn from the University of Bayreuth.

[02/2021 – 06/2021] **Design of the production cycle for the components of a rigid coupling**

Group project for the course "Manufacturing Technology and Engineering". Design of the production cycle for the components of a rigid coupling, involving foundry processes, machine tools, and plastic deformation.

LANGUAGE SKILLS

Mother tongue(s): Italian

Other language(s):

English

LISTENING C1 **READING** C1 **WRITING** C1

SPOKEN PRODUCTION B2 **SPOKEN INTERACTION** B2

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

SKILLS

Fluent - Ansys | Python - livello ottimo | Matlab/Matlab Simulink | Padronanza del Pacchetto Office (Word Excel PowerPoint ecc) | Programmazione in ambiente Julia | Uso software CAD (autodesk Inventor, Solidworks, Solidedge)