

# Doctorate School in “Engineering Science”

## 14th CYCLE

### Curriculum in “Energy Sciences”

#### *Curriculum Coordinator*

1. Prof. Renato Ricci

#### *Curriculum Board:*

2. Prof. Maurizio Bevilacqua
3. Prof. Flavio Caresana
4. Prof. Gianni Cesini
5. Prof. Gabriele Comodi
6. Prof. Francesco Corvaro
7. Prof. Giovanni Di Nicola
8. Prof. Costanzo Di Perna
9. Prof. Giancarlo Giacchetta
10. Prof. Giovanni Latini
11. Prof. Giacomo Lucarini
12. Prof. Claudia Paciarotti
13. Prof. Giorgio Passerini
14. Prof. Massimo Paroncini
15. Prof. Leonardo Pelagalli
16. Prof. Paolo Pierpaoli
17. Prof. Fabio Polonara

#### **Scientific sectors involved:**

ING-IND/06 Fluid Dynamics  
ING-IND/08 Fluid Machinery  
ING-IND/09 Systems for Energy and Environment  
ING-IND/10 Applied Physics for the industry  
ING-IND/11 Applied Physics for the environment  
ING-IND/17 Industrial Plants

## PhD students and Tutors

<i>PhD Student</i>	<i>Tutor</i>
Dott. Claudio CAMPANA	Prof. Flavio Caresana
Dott. Oreste DI GIOVINE	Prof. Maurizio Bevilacqua
Dott. Alessandro FONTI	Ing. Gabriele Comodi
Dott. Matteo LORENZETTI	Ing. Gabriele Comodi
Dott.ssa Maila SARTINI	Prof. Fabio Polonara
Dott. Marco SPITONI	Prof. Flavio CARESANA
Dott.ssa Raffaella VITALI	Prof. Massimo PARONCINI

## Research topics

The Doctorate Course features a multidisciplinary approach to all the topics involving Energy and its impact on Environment and on modern Society.

The main areas of study are reported here, together with a list of the topics of major interest:

1. **Applied Physics:** Applied thermo-dynamics, Heat transfer, Acoustics, Lighting techniques.
2. **Built environment:** Thermo-physics of buildings, Bioclimatic architecture, Energy saving, Energy efficiency, Heating, Ventilating and Air Conditioning (HVAC) systems and equipment, Micro-combined heat and power (CHP) and heat pumps, Energy storage, Applied acoustics, Lighting technology.
3. **Energy conversion:** Innovation in conventional methods for energy conversion, Combustion, Internal Combustion (IC) engines, Turbomachinery, Co-generation and Poli-generation, Renewable Energy Sources (RES), Biofuels production and utilisation, Fuel cells, Refrigeration and heat pumps, Cryogenics.
4. **Energy management:** Analysis of energy systems, Energy planning, Demand Side Management (DSM), Smart grid.
5. **Environmental impact of energy systems:** Environmental modelling and control, Life Cycle Analysis (LCA), Climate change, Emissions in the atmosphere, Thermo-physical properties of fluids.
6. **Industrial plants:** Risk assessment, Maintenance management, Plant management.

## **Educational objectives**

Energy, with all its implications, plays a role more and more important in modern Societies and in their Economies.

Consequently all Energy issues live a moment of huge scientific, technical and economic growth.

This context requires professionals oriented to research & development and equipped with adequate cultural background, able to cope with the challenge of a new vision of Energy as a central theme in economic and social development and at the same time harmonically in sync with environmental protection.

The curriculum in Energy Sciences therefore aims at preparing professionals ready to operate at the highest scientific level within Universities, Public and Private Institutions and Companies in order to satisfy their requests for innovation in terms of both scientific creativity and design ability.

Its goal is to grow researchers endowed with advanced technical and methodological knowledge, and to form the personal creativity abilities of the PhD students, through the practice of the scientific research in advanced topics of the Energy Science fields.

To pursue such goal the PhD student will have to develop a strong capacity to analyze the problems emerging in the research topic of interest, to propose innovative and original solutions, to implement such new ideas by employing suitable tools for this purpose, to work autonomously in a teamwork environment, to recognize the scientific value of the results obtained and to disseminate them within the international community.

## **Possible professional and academic opportunities**

The know-how provided by the present curriculum constitutes the best starting point for a career in the University or in Research Agencies, but it also gives job opportunities in Industries or Public Institutions. Well motivated PhD's will also be able to finalize their knowledge as professionals.

It should be mentioned, in this sense, that the scientific sectors involved in the curriculum give guarantees for a rapid and qualified inclusion in a lot of professional activities: the high level reached by the PhD's, and the number and quality of the scientific publications produced, during and after the Doctorate Course, have permitted some of them to begin the Academic career. On the other hand also those not employed in the University have often found highly qualified occupations, even in those Agencies or Industries that cooperate with UNIVPM in the framework of national or international research projects.