

EngIQ - Doctoral Program in Refining, Petrochemical and Chemical Engineering

A PhD PROGRAM IN AN INDUSTRIAL SETTING

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Ribeirão Preto, 13 de novembro de 2013



universidade de aveiro



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FEUP FACULDADE DE ENGENHARIA
UNIVERSIDADE DO PORTO



INSTITUTO SUPERIOR TÉCNICO
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To say what I am going to say...

- ① Programme Overview
- ② Main features
- ③ Universities, teaching staff, R&D units and companies
- ④ Programme details
 - ④ Course structure, some figures, a seal of quality
- ⑤ Examples of ongoing PhD projects
- ⑥ Final notes - Challenges

Doctoral Program in Refining, Petrochemical and Chemical Engineering I - Overview

☞ **The Doctoral Program in Refining, Petrochemical and Chemical Engineering is the result of a unique cooperation in Portugal, mainly for its dimension and structure, between:**

- 1. The 5 major universities with education and research programmes in the areas of refining, petrochemical and chemical engineering;**
- 2. 5 top companies in the sectors of refining, petrochemical and chemical industries;**
- 3. A cluster formally set in 2009, known as the **Petrochemical, Chemical and Refining Industry Association** (with the acronym **AIPQR**), through which 20 other companies may participate**

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Doctoral Program in Refining, Petrochemical and Chemical Engineering I - Overview

☞ **Part of an important wide programme, including :**

- 1. Cooperation in operator training programmes**
- 2. Cooperation as partners in European R&D projects**
- 3. The PhD programme itself**
- 4. Longlife learning at advanced level - making use of the modules that compose the curriculum part of the PhD programme.**

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Doctoral Program in Refining, Petrochemical and Chemical Engineering II - Main features

- ☞ **The training takes a minimum of 3 years, with an effort of 60 Credits ECTS (European Credit Accumulation and Transfer System) per academic year;**
- ☞ **The training focuses on autonomous scientific research proposed by the companies to be developed by candidates, properly framed and accompanied by supervisors of both the university and industrial partners;**
- ☞ **The curriculum part is provided with flexibility as regards the selection of curricular units to attend, in order to meet:**
 - **the need and interest of the student, covering potential training gaps, having in mind the topic of the thesis.**

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Doctoral Program in Refining, Petrochemical and Chemical Engineering III - Universities, teaching staff, R&D units and companies - I

- ☞ **Universities**
 - ✓ **University of Porto (FEUP-UP)**
 - ✓ **University of Aveiro (UA)**
 - ✓ **University of Coimbra (FCT-UC)**
 - ✓ **New University of Lisbon (FCT-UNL)**
 - ✓ **University of Lisbon (IST-UTL)**
- ☞ **Companies**
 - ✓ **Galp Energia**
 - ✓ **CUF - Químicos industriais**
 - ✓ **Euroresinas**
 - ✓ **Cires**
 - ✓ **Sociedade Portuguesa de Ar Líquido**
 - ✓ **20 other companies associated in AIPQR**

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**Doctoral Program in Refining, Petrochemical and Chemical Engineering
III - Universities, teaching staff, R&D units and companies - II**

☞ **Teaching Staff and Supervisors**

- **Faculty, all working in top R&D Research Units recognised by FCT (Portuguese Foundation for Science and Technology)**
- **Portuguese experts**
- **Foreign experts**

☞ **R&D units**

- **11 major R&D Units from the different partner universities**
 - **FEUP-UPorto: LSRE, LEPAE, CEFT**
 - **UAveiro: CICECO, DQ**
 - **FCT-UCoimbra: CIEPQPF**
 - **FCT-UNLisboa: REQUIMTE**
 - **IST-ULisboa: CQE, CPQ, ICEMS, IBB**

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**Doctoral Program in Refining, Petrochemical and Chemical Engineering
IV - Programme details - Course structure and some figures**

- ☞ **162 work hours per course unit (6 credits fo the European credit system)**
 - **40 hours of contact+ 40 hours of tutorials + individual work**
- ☞ **Lectures on fridays (16:00-20:00) and saturdays (9:00-13:00)**
- ☞ **Lectures in different locations, supported by videoconference**
- ☞ **Some figures from 2009 and 2012 – 4 editions**
 - **21 PhD students (2 concluded, 4 about to conclude)**
 - **42 students with a diploma of Advanced Studies (human resources of the companies)**
 - **10 students performed single course units**

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Doctoral Program in Refining, Petrochemical and Chemical Engineering IV - Programme details - a seal of quality

☞ A seal of quality:

- In 2012 the Portuguese Foundation for Science and Technology (FCT) launched a programme to finance competitive PhD Programmes with one of three possible profiles:
 - ✓ National academic cooperation
 - ✓ With international cooperation
 - ✓ With industrial participation

- EngIQ was 1 of the 58 programmes selected, out of 252 applications, and the only industry-based programme



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Doctoral Program in Refining, Petrochemical and Chemical Engineering V - Examples of ongoing PhD projects - I

☞ Galp Energia

- Solid catalysts for alkylation of isobutane and mixtures of butylenes
Supervisors: José Luís Figueiredo (FEUP-UP), Isabel Fonseca (FCT-UNL)
Coordinator Galp Energia: Eng^o José Inverso

- Extraction of mercaptans from 'jet-fuel' streams through ionic liquids
Supervisors: João Coutinho (UA), João Crespo (FCT-UNL)
Coordinator Galp Energia: Eng^o Fernando Lopes Morgado

- Optimization of the Parex Units in GALP Refinery
Supervisors: Alírio Rodrigues (FEUP-UP), José Paulo Mota (FCT-UNL)
Coordinator Galp Energia: Eng^a Rita Santos

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**Doctoral Program in Refining, Petrochemical and Chemical Engineering
V - Examples of ongoing PhD projects - II**

☞ **CUF-QI**

- **Intensification in aniline production**
Supervisors: Clemente Pedro Nunes (IST-UTL), Filipe Freire (IST-UTL), Nuno Oliveira (FCT-UC)
Coordinator CUF-QI: Dr. Paulo Araújo
- **Micromixing in aromatics production**
Supervisors: Cristina Gaudêncio (FCT-UC)
Coordinator CUF-QI: Dr.^a Dulce Silva
- **A study on the electrolysis of sodium chloride employing the cell membrane process**
Supervisors: Adélio Mendes (FEUP-UP), Christopher Brett (FCT-UC)
Coordinator CUF-QI: Dr. Paulo Araújo

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**Doctoral Program in Refining, Petrochemical and Chemical Engineering
V - Examples of ongoing PhD projects - III**

☞ **EURORESINAS**

- **Optimizing productivity of the resins plant**
Supervisors: Nuno Oliveira (FCT-UC), Henriques Matos (IST-UTL)
Coordinator EURORESINAS: Eng^o Ricardo Alvim

☞ **FIMA**

- **Optimization of the utilities in industrial plants in order to increase industrial eco-efficiency**
Supervisors: Henriques Matos (IST-UTL), Fernando Martins (FEUP-UP)
Coordinator FIMA: Eng^o António Leal de Oliveira

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Doctoral Program in Refining, Petrochemical and Chemical Engineering
Some final notes - Challenges

☞ **Challenges for the programme**

- Capacity to generate and manage diversity of educational offer that serves the interests of industry and science
 - ✓ Effective capacity to promote R&D&I in industry
- Ability to promote quality training with the required outputs – good patents, good papers...
- Sustainability – keep high the interest of the industry

☞ **Challenges for the Director of Studies**

- Keep a balance in the contribution of the different academic institutions – in the offer of modules and in supervision
 - ✓ Keep institutions happy!!!
- Solve the complex issue of IP - Intellectual Property

☞ **AND... Open the programme to other publics**

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Many thanks for your attention and

[I leave with a short film about FEUP and EngIQ!](#)

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