Research, Innovation and Doctoral Studies at UPM

Doctoral Studies @ UPM

Prof. Asunción Gómez-Pérez
Vice-Rector for Research, Innovation and Doctoral Studies
Table of contents

1. Universidad Politécnica de Madrid (UPM)
2. International Doctorate School
3. Doctoral Areas and Doctoral Programs
4. Doctorate at UPM
5. Transversal training activities for PhD candidates
6. Programa Propio de Investigación
1. Universidad Politécnica de Madrid (UPM)
Main Technological University in Spain

Specialized in engineering and architecture

nº 58 Ranking QS (2022)
nº 94 employability in QS ranking (2022)

Source of high impact knowledge in Spain

nº 1 in university patent applications
nº 1 university in attracting R&D European funds (+116 M€ in H2020)
nº 1 in attracting R&D contracts with industry
nº 1 in new technology ventures creation

International Excellence Campus

CEI Moncloa (UPM-UCM)
Information Technology Campus-I2Tech (UPM)
Rectorate in Madrid

5 Campuses in Madrid area

2 International Excellence Campus awarded by the Ministry of Education (MEC-MINECO)
- 15 Schools
- 1 Faculty (Sports)
- 1 Fashion Design Center
- 5 R&D&I Institutes
- 16 R&D&I Centers
- 2 Innovation Centers
- 218 Research Groups
- 61 Departments

Budget (2023)

410 M€ Total funds
**UPM: Some figures**

### Research in 2021 – ca. 138 M€
- 119.80 M€ in financed projects
  - 24.45 M€ National & Regional projects
  - 15.73 M€ International projects
  - 17.88 M€ Private projects (companies and foundations)
  - 61.74 M€ PRTR
- 18,41 M€ in HR competitive contracts
- +2,300 indexed publications

### Technological Innovation
- 567 patents in force to date
- 45 priority patents filed in 2021
- 72 University-business chairs in 2021
- 313 spin-offs created and coached from 1998 to date
- 11 exploitation contracts in 2021
- 62% spin-off Survival rate (3rd year)
- + 155 M€ from investors (2005-2022)
Higher education, research and innovation in all Engineering fields:

- Aeronautics
- Agronomy
- Architecture
- Biomedicine
- Civil Engineering
- Energy
- Forestry
- Industrial
- Mining
- Naval
- Informatics
- Telecommunication
- Topography
- + Sports and Fashion Design

- 53 accredited bachelor degrees
- 95 accredited master degrees
- 17 accredited combined bachelor and master degrees
- 44 accredited doctoral programmes
- 74 double degree programme agreements with international universities
- 248 UPM academic programmes (executive master, expert specialization and lifelong training programmes)

High potential for increasing participation in 
multidisciplinary engineering areas
23 R&D&I Centers

DIGITAL
1. Information Processing and Telecommunications Center (IPTC)
2. Center for Supercomputation & Simulation (CCS)
3. Integral Domotics Center (CeDInt)
4. Centre on Software Technologies and Multimedia Systems for Sustainability (CITSEM)
5. Artificial Intelligence Center (AI.innovation Space)

MOBILITY
6. Transport Research Center (TRANSyT)
7. Institute for Automobile Research (INSIA)

MATERIALS
8. Institute for Optoelectronic Systems and Microtechnology (ISOM) (Micronanofabs, ICTS)
9. Structural Material Research Center (CIME)
10. Center for Advanced Materials and Devices for ICT (CEMDATIC)

ENERGY
11. Institute for Solar Energy (IES)
12. Institute for Nuclear Fusion (IFN)

SUSTAINABILITY, BIOTECHNOLOGY and HEALTH
13. Research Center for Biotechnology and Plant Genomics (CBGP-INIA) (Severo Ochoa award)
14. Biomedical Technology Center (CTB)
15. Research Center for the Management of Agricultural and Environmental Risks (CEIGRAM)
16. R&D&I Center for Biodiversity Conservation and Sustainable Development (CBDS)

INDUSTRIAL ENGINEERING
17. Center for Automation and Robotics (CAR, UPM-CSIC)
18. Laser Center
19. Center of Electronics for the Industry (CEI)
20. Institute for Microgravity “Ignacio da Riva” (IDR)
21. Technological Center for Safety and Quality in Energy Industries and Mines (TECMINERGY)

INNOVATION
22. Innovation and Technology for Development Centre (itdUPM)
23. Centre for Support for Technological Innovation (CAIT)
**Human Resources & Students**

**Human Resources**

- **2,891 Faculty academics**
  - 375 Full professors
- **1,742 Administration and Service Staff**
- **503 competitive contracts in 2021**
  - 323 predoctoral researchers
  - 107 postdoctoral researchers
  - 73 technicians and managers

**Students**

- Over 30,000 undergraduate students (2021/2022)
- 6,500 master students (2021/2022)
- Over 2,000 PhD Students (2022/2023)
- +250 PhD Theses defended (2021/2022)
- + 1,300 International mobility (incoming)
- + 1,800 International mobility (outcoming)
- + 6,700 Internships (2020/2021)
- 48 associations (19 cooperation development, 17 sports, 12 drama)
- 107 Medals obtained in official competitions
Connected to Research & Innovation networks

- NEM
- BDV
- HP
- Future Internet PPP
- NESSI
- EIT Digital
- Quantum Flagship
- 5G PPP
- ARTEMIS Industry Association
- AIOTI
- EU Robotics
2. UPM International Doctorate School
International Doctoral School: Visibility and “School” model

**INTERNAL**

+2,000 PhD Students &
+2,000 PhD Advisors (UPM and external)

**EXTERNAL**

Information
Foreigners Outreach
Industrial PhD

**Governance Archive Documentation**

**FORMATIVE – QUALITY**

Training & Entrepreneurship
PhD Theses contests and prizes
“Programa Propio de Investigación”
3. Doctoral Areas and Doctoral Programs
# Doctoral Areas & Doctoral Programs

## MANUFACTURING & INDUSTRY
1. Aerospace Engineering
2. Automation and Robotics
3. Economy and Innovation Management
4. Engineering in Industrial Organization
5. Environmental, Chemical and Material Engineering
6. Electrical and Electronic Engineering
7. European Doctorate in Industrial Management
8. Fluid Mechanics
9. Mechanical Engineering
10. Production Engineering and Industrial Design
11. Research, Modeling and Risk Analysis in Environment
12. Sustainable, Nuclear and Renewable Energy

## ICTs
1. Artificial Intelligence
2. Biomedical Engineering
3. Communication Systems and Technologies
4. Computation Science and Technology for Smart Cities
5. Electronic Systems Engineering
7. Photovoltaic Solar Energy
8. Systems and Services Engineering for the Information Society
9. Software, Systems and Computation
10. Telematic System Engineering

## AGRONOMICS, FORESTRY & ENVIRONMENT
1. Advanced Forest Research
2. Agricultural Engineering
3. Biotechnology and Genetic Resources of Plants and Assoc. Microorganisms
4. Complex Systems
5. Engineering and Management of Environment
6. Environmental Technology for Sustainable Agriculture
7. Project Planning for Rural Development and Sustainable Management

## ARCHITECTURE
1. Advanced Architectural Design
2. Architecture and Urban Planning
3. Architecture Heritage
4. Building and Architecture Technology
5. Edification Structures
6. Sustainability and Urban Regeneration

## CIVIL ENGINEERING
1. Earth Informatics Engineering
2. Civil Engineering Systems
3. Structural, Geotechnical and Material Engineering
4. Naval Architect, Marine and Ocean Engineering
5. Technological Innovation in Building Construction

## ARTS & SOCIAL SCI.
1. Architecture Communication
2. Architecture, Design, Fashion and Society
3. Music and its Sciences and Technologies
4. Physical Activity and Sport Sciences
4. Doctorate at UPM
Eligibility requirements /criteria*

**Admission (Doctoral Program)**

**PhD Registration (to be renewed every year)**

**Transversal training activities & Teaching collaborations**

**Secondments**

**PhD Thesis Defense**

**PhD Degree**

*Candidates must have completed the studies that lead to an official Spanish (or from another country of the EHEA) university degree awarding 300 ECTS credits, of which at least 60 ECTS credits must correspond to master level. Or they must have completed a degree in a University not adapted to the EHEA that gives access to doctoral studies.*
International Doctorate
✓ Three months international secondment
✓ PhD thesis reviewed by international experts
✓ PhD thesis committee with international members
✓ PhD thesis and dissertation: Spanish and other language

Industrial Doctorate
✓ UPM-Industry collaboration agreement
✓ Industrial research project
✓ Industrial secondment

Co-tutelle
✓ Individual agreement for every PhD candidate.
✓ Two PhD certificates, one from each university
✓ At least 2 PhD advisors, one from each university
✓ Spend part of the PhD at each university (agreed by both universities)
PhD Students registration

PhD Students registered

Extinction of former Royal Decrees (RD 56, RD 778 & RD 1393)

ca. 2,000 PhD students per year on average

ca. 2,000 PhD students per year on average
PhD Theses defended

Extinction of former Royal Decrees (RD 56, RD 778 & RD 1393)

ca. 230 PhD theses defended per year on average (excl. 2014/2015-2016/2017)
ca. 44% International Doctorates on average from 2017/2018 onwards

MI: International Doctorate
ME: European Doctorate

<table>
<thead>
<tr>
<th>Year</th>
<th>PhD Theses (n)</th>
<th>MI (n)</th>
<th>ME (n)</th>
<th>ME/MI (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>06/07</td>
<td>163</td>
<td></td>
<td>22</td>
<td>13</td>
</tr>
<tr>
<td>07/08</td>
<td>196</td>
<td></td>
<td>28</td>
<td>14</td>
</tr>
<tr>
<td>08/09</td>
<td>184</td>
<td></td>
<td>36</td>
<td>20</td>
</tr>
<tr>
<td>09/10</td>
<td>230</td>
<td></td>
<td>55</td>
<td>24</td>
</tr>
<tr>
<td>10/11</td>
<td>244</td>
<td></td>
<td>44</td>
<td>18</td>
</tr>
<tr>
<td>11/12</td>
<td>212</td>
<td></td>
<td>35</td>
<td>17</td>
</tr>
<tr>
<td>12/13</td>
<td>350</td>
<td></td>
<td>22</td>
<td>6</td>
</tr>
<tr>
<td>13/14</td>
<td>305</td>
<td>110</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>14/15</td>
<td>376</td>
<td>129</td>
<td>65</td>
<td>38</td>
</tr>
<tr>
<td>15/16</td>
<td>889</td>
<td>201</td>
<td>44</td>
<td>35</td>
</tr>
<tr>
<td>16/17</td>
<td>418</td>
<td>167</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>17/18</td>
<td>188</td>
<td>86</td>
<td>6</td>
<td>40</td>
</tr>
<tr>
<td>18/19</td>
<td>233</td>
<td>107</td>
<td>2</td>
<td>46</td>
</tr>
<tr>
<td>19/20</td>
<td>181</td>
<td>93</td>
<td></td>
<td>46</td>
</tr>
<tr>
<td>20/21</td>
<td>273</td>
<td>104</td>
<td></td>
<td>51</td>
</tr>
<tr>
<td>21/22</td>
<td>251</td>
<td>98</td>
<td></td>
<td>38</td>
</tr>
</tbody>
</table>
Doctoral Areas:
Registration and defence
PhD Students registration: Internationality

Internationality (2022/2023)

- Spanish: 65%
- Other: 35%

Spanish PhD students (2021/2022)

- Men: 68%
- Women: 32%

Other PhD students (2021/2022)

- Men: 62%
- Women: 38%
PhD Students nationalities (2021/2022)
Industrial Doctorate (from 2017 onwards)

- **Industrial Doctorate contracts** granted by the Government of Madrid
- **Framework agreements** (UPM-company) to carry out Industrial Doctorates
Villard de Honnecourt framework agreement (Architecture)
5. Transversal training activities for PhD candidates
Transversal training activities
for PhD candidates (tentative)

January-February

March-April

May-June

October-November

- Innovation and entrepreneurship
- Introduction to business
- Patents and copyrights
- Science communication and dissemination
- Technology commercialization
- Methodology to support research I
- ERC Writing Days
- Postdoctoral career projection
- Symposium “Your thesis in a nutshell”
- Methodology to support research II
- Bibliographic resources
- MSCA-IF Writing Days
- Researchers’ digital identity
- Normative aspects of the doctorate
- Making my research more responsible: Exploring RRI
- International R&D&I projects
- Writing in Engineering

Teaching collaboration (up to 60h/year - max. 180h/PhD candidate)

- Teaching collaboration (up to 60h/year - max. 180h/PhD candidate)

APPLYING RESPONSIBLE RESEARCH AND INNOVATION (RRI) CONCEPTS

Strategies for Communication:
Presenting Your Thesis Effectively
## Transversal training activities for PhD candidates II

### EVENTOS, CURSOS Y SEMINARIOS DEL VICERRECTORADO DE INVESTIGACIÓN, INNOVACIÓN Y DOCTORADO (2023)

<table>
<thead>
<tr>
<th>mes</th>
<th>ene</th>
<th>feb</th>
<th>mar</th>
<th>abr</th>
<th>may</th>
<th>jun</th>
<th>jul</th>
<th>ago</th>
<th>sep</th>
<th>oct</th>
<th>nov</th>
<th>dic</th>
</tr>
</thead>
<tbody>
<tr>
<td>活动</td>
<td>_promoción y gestión de proyectos y actividades internacionales</td>
<td>Ofertas web UPM /Euraxess</td>
<td>Infor day PF/DON supervisores</td>
<td>Evento empresas H2</td>
<td>Info day PF con NCP</td>
<td>OPI para doctorandos FTD</td>
<td>Gen Assembly Hydrogen Europe Res</td>
<td>OPI days 2023</td>
<td>Welcome day new researchers</td>
<td>ERC Reading days FECYT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### WS Estratégicos

- Compra pública Innov. (22)

### INNOVACIÓN Y COMERCIALIZACIÓN

- WIT UPM2T
- actuaupm: premios finales

### EMPRENDIMIENTO

- Formación básica actuaupm
- Formación avanzada actuaupm

### DOCTORADO

- Cursos de formación transversal para doctorandos (EID)
- Actuaupm: premios ideas
- UPm2T (jun-sep)

### DOCTORADO

- Novedades Normativa permanencia
- Novedades Thesis
- Mujer y niña en Ciencia [10]
- Cómo aumentar el impacto de tus publicaciones
- Comunicación y divulgación de la ciencia

### SEMINARIOS UPM - COMUNIDADES UPM

- Pendiente

Publicada 03/02/2023 (se irá actualizando) - las fechas son orientativas

Para más información https://eventos.upm.es/
6. Programa Propio de Investigación
Specific calls for PhD candidates
(total budget: +1,70 M€)

- Pre-doctoral contracts
- International conferences
- Secondments (3-month international secondment to obtain the International Doctorate)
- Open access publications (Q1)
- Social action (transport)
Thank you for your attention!

where, what, why, when, how, who