Research, Innovation and Doctoral Studies at UPM

Doctoral Studies @ UPM

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Vice-Rector for Research, Innovation and Doctoral Studies
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1. *Universidad Politécnica de Madrid (UPM)*
Why UPM?

Main Technological University in Spain

Specialized in engineering and architecture

- nº 75 Ranking QS (2021)
- nº 79 employability in QS ranking (2020)

Source of high impact knowledge in Spain

- nº 1 in university patent applications
- nº 1 university in attracting R&D European funds (+110 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)
- 16 Schools
- 1 Faculty (Sports)
- 1 Fashion Design Center
- 5 R&D&I Institutes
- 14 R&D&I Centers
- 201 Research Groups
- 61 Departments

**Budget (2021)**

359.7 M€ Total funds
### UPM: Some figures

<table>
<thead>
<tr>
<th>Research in 2020 – ca. 63M€</th>
<th>Technological Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ 55,44 M€ in financed projects</td>
<td>➢ 567 patents in force to date</td>
</tr>
<tr>
<td>✓ 3.82 M€ National &amp; Regional projects</td>
<td>➢ 34 priority patents filed in 2020</td>
</tr>
<tr>
<td>✓ 33.21 M€ International projects</td>
<td>➢ 75 University-business chairs in 2020</td>
</tr>
<tr>
<td>✓ 18.42 M€ Private projects (companies and foundations)</td>
<td>➢ + 280 spin-offs created and coached from 1998 to date</td>
</tr>
<tr>
<td>➢ 7,55 M€ in HR competitive contracts</td>
<td>➢ 10 exploitation contacts in 2020</td>
</tr>
<tr>
<td>➢ +2,300 indexed publications</td>
<td>➢ &gt;67% spin-off Survival rate (3rd year)</td>
</tr>
<tr>
<td></td>
<td>➢ + 114 M€ from investors (2010-2020)</td>
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</tbody>
</table>
Fields of teaching and programmes

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

- ✔️ 52 Bachelor Degrees
- ✔️ 67 Master Degrees
- ✔️ 44 Doctoral Programmes
- ✔️ 94 Double degree agreements with foreign universities
- ✔️ 18 Undergraduate + Master Joint Programmes
- ✔️ 123 University-Specific Programmes (Expert, Life-long learning...)

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

**DIGITAL**
1. Information Processing and Telecommunications Center (IPTC)
2. Center for Supercomputuation & Simulation (CCS)
3. Integral Domotics Center (CeDInt)
4. Centre on Software Technologies and Multimedia Systems for Sustainability (CITSEM)
5. Al.nnovation 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)

**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)

**INDUSTRIAL ENGINEERING**
16. Center for Automation and Robotics (CAR, UPM-CSIC)
17. Laser Center
18. Center of Electronics for the Industry (CEI)
19. Institute for Microgravity “Ignacio da Riva” (IDR)

**INNOVATION**
20. Innovation and Technology for Development Centre (itdUPM)
21. Centre for Support for Technological Innovation (CAIT)
Human Resources

- 2,928 Faculty academics
  - +380 Full professors
- 1,785 Administration and Service Staff
- 508 competitive contracts in 2020
  - 311 predoctoral researchers
  - 127 postdoctoral researchers
  - 70 technicians and managers

Students

- 29,300 Undergraduate students
- 6,180 Master degree students
- 2,000 PhD students
- + 1,300 International mobility (incoming)
- + 1,800 International mobility (outgoing)
- + 6,300 Internships
- + 45 Associations
- + 125 Medals obtained in official competitions
Vicerrectorado de Investigación, Innovación y Doctorado

Connected to Research & Innovation networks

- NEM: Networked & Electronic Media
- BDV: BIG DATA VALUE ASSOCIATION (Full Member)
- Human Brain Project
  Unifying our understanding of the human brain.
- Future Internet PPP
- DIET: Digital Innovation and Entrepreneurship Technology
- QUANTUM FLAGSHIP
- NESSI
- ARTEMIS Industry Association
  The association for R&D actors in embedded systems
- 5G PPP
- EU Robotics
- AIOTI
  ALLIANCE FOR INTERNET OF THINGS INNOVATION

Vicerrectorado de Investigación
2. UPM International Doctorate School
UPM R&D&I Strategy

PhD Programs
quality
PhD Students
training

PhD visibility

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
### 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

### 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

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

### 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)

Year 1 Year 2 Year 3 Year 4 Year 5 Extension 1 (1 Year) Extension 2 (1 Year)

Secondments

Transversal training activities & Teaching collaborations

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.
Doctorate at UPM: Modalities

**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

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

ca. 2,000 PhD students per year on average
ca. 225 PhD theses defended per year on average (excl. 2014/2015-2016/2017) 
ca. 48% International Doctorates on average from 2017/2018 onwards
Doctoral Areas:
Registration and defence

PhD Students (2020/2021)
- ICTs: 22%
- Agro. & Environ.: 15%
- Manuf. & Ind.: 22%
- Manuf. & Ind.: 15%
- Civil: 15%
- Architecture: 17%
- Arts & SSci.: 9%

PhD theses defended (2019/2020)
- ICTs: 24%
- Manuf. & Ind.: 29%
- Civil: 15%
- Architecture: 17%
- Arts & SSci.: 2%

International PhD (2019/2020)
- ICTs: 23%
- Manuf. & Ind.: 36%
- Agro. & Environ.: 15%
- Civil: 14%
- Architecture: 7%
- Arts & SSci.: 5%
PhD Students registration: Internationality

Internationality (2020/2021)

- Spanish: 66%
- Other: 34%

Spanish PhD students (2020/2021)

- Women: 31%
- Men: 69%

Other PhD students (2020/2021)

- Women: 37%
- Men: 63%
PhD Students nationalities
(2020/2021)
Industrias Doctorate (from 2017 onwards)

- Industrial Doctorate contracts granted by the Government of Madrid
- Framework agreements (UPM-company) to carry out Industrial Doctorates

Logos of companies and organizations involved in Industrial Doctorates.
Co-tutelle (from 2017 onwards)

Villard de Honnecourt framework agreement (Architecture)

Università Iuav di Venezia

paris-belleville
edcole nationale supérieure d’architecture

TU Delft
Faculty of Architecture
and the Built Environment

Bouwkunde
5. Transversal training activities for PhD candidates
## Transversal training activities for PhD candidates (tentative)

<table>
<thead>
<tr>
<th>January-February</th>
<th>March-April</th>
<th>May-June</th>
<th>October-November</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Innovation and entrepreneurship</strong></td>
<td><strong>Patents and copyrights</strong></td>
<td><strong>Postdoctoral career projection</strong></td>
<td><strong>Researchers' digital identity</strong></td>
</tr>
<tr>
<td><strong>Introduction to business</strong></td>
<td><strong>Science communication and dissemination</strong></td>
<td><strong>Symposium “Your thesis in a nutshell”</strong></td>
<td><strong>Normative aspects of the doctorate</strong></td>
</tr>
<tr>
<td><strong>Technology commercialization</strong></td>
<td><strong>Technology commercialization</strong></td>
<td><strong>Methodology to support research II</strong></td>
<td><strong>Making my research more responsible: Exploring RRI</strong></td>
</tr>
<tr>
<td><strong>Methodology to support research I</strong></td>
<td><strong>Methodology to support research I</strong></td>
<td><strong>Bibliographic resources</strong></td>
<td><strong>International R&amp;D&amp;I projects</strong></td>
</tr>
<tr>
<td><strong>ERC Writing Days</strong></td>
<td><strong>ERC Writing Days</strong></td>
<td><strong>MSCA-IF Writing Days</strong></td>
<td><strong>Writing in Engineering</strong></td>
</tr>
<tr>
<td><strong>Teaching collaboration (up to 60h/year - max. 180h/PhD candidate)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 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
Transversal training activities for PhD candidates II

EVENTOS, CURSOS Y SEMINARIOS DEL VICERRECTORADO DE INVESTIGACIÓN, INNOVACIÓN Y DOCTORADO (2021)

- **Promoción y gestión proyectos y actividades internacionales**
  - 40 min OPI – 2 sesiones/mes
  - OPI para doctorandos

- **Horizonte Europeo**
  - ERI
  - Writing days ERC II
  - ILL (UPM Big Science)
  - ERC post-writing days

- **FPI y portal web DIN (2D)**
  - ESA (UPM Big Science)
  - Writing days ERC II
  - ERC post-writing days

- **ET Day**

- **Foro de Responsables Horomólogos (RedEIT) – 1 sesión/mes**

**WS Estratégicas**
- Compra pública
- Jornada Patentes
- Jornada CiberTIC
- Guías de comunicación

**INNOVACIÓN Y COMERCIALIZACIÓN**

**EMPRENDEDURISMO**

**DOCTORADO**
- Cursos de formación transversal para doctorandos

**Doctorado**
- Asuntos normativos y formativos del doctorado
- Identidad digital
- How to write and present a research paper
- Metodología y documentación científica
- Metodología para la investigación
- Investigación más responsable: Explorando la RRI

- Realidad y claves de la carrera investigadora
- Fomento de la movilidad
- Comunicación y divulgación científica
- Simposio UPM

- Aumentar impacto publicaciones
- Recursos bibliográficos

- Eventos UGC+ – Divulgación Científica

**Ciudades limpias y saludables (I-II)**

[https://www.upm.es/investigacion/difusion/DivulgacionUPM](https://www.upm.es/investigacion/difusion/DivulgacionUPM)

*Debido a la situación sanitaria actual, los eventos en Cerecedilla están postergados.*

Publicado 29/01/2020 (se irá actualizando) - las fechas son orientativas.
6. Programa Propio de Investigación
Programa Propio de Investigación
(Vice-Rectorate for Research, Innovation and Doctoral Studies funds)

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)
Thank you for your attention!