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)
Main Technological University in Spain

Specialized in engineering and architecture

nº 94 Ranking QS (2019)
  2nd Spanish speaking university in QS ranking (2019)
nº 92 employability in QS ranking (2019)

Source of high impact knowledge

nº 1 in university patent applications
nº 1 in attracting R&D European funds
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)
UPM on the Map

Rectorate in Madrid

5 Campuses in Madrid area

2 International Excellence Campus awarded by the Ministry of Education (MEC-MINECO)

Ciudad Universitaria (HQ) & Madrid City Center

Montegancedo

Campus Sur

Getafe

Investigación, Innovación y Doctorado
15 Schools
1 Faculty (Sports)
1 Fashion Design Center
5 R&D&I Institutes
15 R&D&I Centers
1 Joint Technology Center
200 Research Groups
61 Departments

Budget (2019)
354.9 M€ Total funds
UPM: Some figures

Research in 2018

- + 54 M€ in financed projects
  - 14.75 M€ Regional projects
  - 8.65 M€ National projects
  - 15.71 M€ International projects
  - 15.27 M€ Private projects and technical assistance to companies
- + 2,300 indexed publications

Technological Innovation

- 540 patents in force to date
- 40 patents currently in exploitation
- 38 priority patents filed in 2018
- 71 University-business chairs
- + 200 spin-offs created and coached from 1998
- >70% spin-off Survival rate (3rd year)
- + 60 M€ from investors (from 2007)
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 + Fashion Design + Music

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 Supercomputations & Simulation (CCS)
3. Integral Domotics Center (CeDInt)
4. Centre on Software Technologies and Multimedia Systems for Sustainability (CITSEM)

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

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

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

BIOTECHNOLOGY and HEALTH
12. Research Center for Biotechnology and Plant Genomics (CBGP-INIA) (*Severo Ochoa award*)
13. Biomedical Technology Center (CTB)
14. Research Center for the Management of Agricultural and Environmental Risks (CEIGRAM)

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

INNOVATION
19. Innovation and Technology for Development Centre (itdUPM)
20. Centre for Support for Technological Innovation (CAIT)
21. Innovation space (UPM-Accenture)
Human Resources & Students

Human Resources

- +2,800 Faculty academics
  - +380 Full professors
- 670 Contracted researchers
- +1,200 Administration and Service Staff
- +450 Students granted by projects

Students

- + 31,000 Undergraduate
- + 4,800 Master degree
- + 2,100 PhD Students
- + 1,300 International Erasmus mobility
- + 1,400 National Erasmus mobility
- + 5,900 Work practice in companies
- + 450 Associations
- + 120 Medals obtained in official competitions
Connected to Research & Innovation networks

Human Brain Project
Unifying our understanding of the human brain.
2. International Doctorate School
International Doctorate School

UPM R&D&I Strategy

EID
ESCUELA INTERNACIONAL DE DOCTORADO / UPM

PhD
Programs
quality
PhD Students
training

PhD
visibility
International Doctoral School: Visibility and “School” model

**INTERNAL**

- +1,500 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”

Vicerrectorado de Investigación, Innovación y Doctorado
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

### AGROFORESTRY & 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. Building and Architecture Technology  
5. Edification Structures  
6. Sustainability and Urban Regeneration

### ARTS & SOCIAL SCI.

1. Architecture Communication  
2. Architecture, Design, Fashion and Society  
3. Physical Activity and Sport Sciences  
4. Music and its Science and Technologies
4. Doctorate at UPM
Doctorate at UPM (RD 99/2011)

Eligibility requirements /criteria*

Admission (Doctoral Program)

PhD Registration (to be renewed every year)

Transversal training activities & Teaching collaborations

Secondments

PhD Thesis Defense

PhD Degree

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

*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

PhD Students registered

Academic year

PhD Students registered (Total)

2012 2013 2014 2015 2016 2017 2018

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

ca. 2,000 PhD students per year on average

200x refers to academic year 200x/200x+1
Doctoral Areas: Registration and defence

**PhD Students registration (2018/2019)**

- Architecture: 21%
- ICTs: 21%
- Civil: 14%
- Manuf. & Ind.: 14%
- Agro. & Environ.: 14%
- Arts & SSci.: 7%

**PhD Theses defended (2017/2018)**

- Architecture: 18%
- ICTs: 28%
- Civil: 15%
- Manuf. & Ind.: 8%
- Agro. & Environ.: 22%
- Arts & SSci.: 9%

**International Doctorate (2017/2018)**

- Architecture: 9%
- ICTs: 35%
- Civil: 7%
- Manuf. & Ind.: 26%
- Agro. & Environ.: 14%
- Arts & SSci.: 9%
1. Registration & Defence: 30% women vs. 70% men (average)
2. Agroforestry & Environment: Chemical and biological approaches which are topics with a greater representation of women
3. Manufacturing & Industry: lower representation of women
PhD Students registration: Internationality

Internationality (2018/2019)

- Spanish: 68%
- Other: 32%

Spanish PhD students (2018/2019)

- Men: 70%
- Women: 30%

Other PhD students (2018/2019)

- Men: 67%
- Women: 33%
PhD Students nationalities
(2018/2019)
21 Industrial Doctorate contracts granted by the Government of Madrid

Framework agreements (UPM-company) to carry out Industrial Doctorates
Co-tutelle (from 2017 onwards)

Villard de Honnecourt framework agreement (Architecture)

Universita Iuav di Venezia

paris-belleville

colle nationale superieure 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

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

- Innovation and entrepreneurship
- 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
- Writing in Engineering

**Workshop**

**APPLYING RESPONSIBLE RESEARCH AND INNOVATION (RRI) CONCEPTS**

**Strategies for Communication:** Presenting Your Thesis Effectively
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: 1,690,000.00 €)

- **Pre-doctoral contracts** (up to 4 years)
- **International conferences**
- **Secondments** (3-month international secondment to obtain the International Doctorate)
Thank you for your attention!