

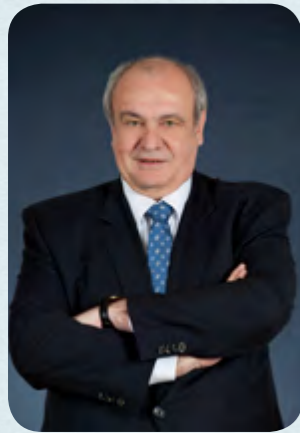


## Official Masters' Degree Studies

Discover the wide range of Official Masters' Degree Studies at the *Universidad Politécnica de Madrid*, a European benchmark for its teaching and research work



## In support of talent



*Carlos Conde,  
rector*

It is a pleasure to present the academic range of Official Masters' Degrees on offer at the *Universidad Politécnica de Madrid (UPM)*. Leading this prestigious institution, in which many of its Schools have their origins in the eighteenth and nineteenth centuries, even though it was created as a Universidad in 1971, gives me the opportunity to address these few lines to those people who have chosen the UPM for their specialization studies just like those who will use them in their activities and companies.

Our academic range is directed at the specialized training needs in the fields of engineering, architecture, technology and sports sciences, understood in a broad concept. The quality of the Masters' Degrees described here is based on five pillars. In the first place, the quality and solid reputation of our teachers together with that of our researchers, prestigious as professionals, with wide ranging experience. Another element is the high level of our facilities which allow experiments and practices to be carried out under very similar conditions to those in normal professional work. The third component is anchored in one of the distinguishing features of our university: collaboration with business, the transfer of technology and innovation, present to a greater or lesser degree in our Masters' Degrees, in the form of practices, joint projects, conferences and seminars given by practitioners, etc.

We have not forgotten that we offer an integral training that completes the scientific-technological knowledge with transversal skills so much in demand by companies in the sector such as internationalization and the mastering of English, leadership and entrepreneurship and innovation, excellent measures of oral and written communication, etc. And finally, the excellence of the applied research which the UPM has accumulated, teamwork, creativity in the search for scientific solutions, technologies and organization, which allows the content to go far beyond its immediate application together with its preparation with new methods and technologies which are yet to come in business applications.

Thus, the UPM is committed to the promotion and support of the talent of our graduates by means of their scientific, technological, social and cultural training development in an environment of business and international collaboration. As Jacinto Benavente once said: "Many believe that having talent is a question of luck but nobody believes that luck may be a question of having talent".

The UPM opens its doors to those in search of a differentiated and singular training which allows not only the learning of high value scientific and technological knowledge but also how to work as efficient, creative and responsible professionals in their role in society.

## A singular offer for postgraduate studies



*Juan José Moreno,  
vicerrector de  
Planificación Académica  
and Doctorado*

The academic range of Official Masters' Degrees from the UPM which is set out in this publication has been designed taking into account several singular dimensions which are characteristics of our university. In the first place, a series of Masters' Degrees that enables the carrying out of regulated professions in the field of engineering or education. These degrees have been designed to be extremely demanding, with the objective of guaranteeing the highest degree of professional qualification, which is demanded by the leading companies in the engineering, architecture, sports or education sectors. Our objective is to offer these companies extremely qualified professionals with great talent and commitment, called upon to occupy the highest levels of responsibility. These degrees that are not regulated do however deepen the knowledge in more specialized aspects, orientated to business demands or scientific advances with the interdisciplinary nature as a distinguishing feature of added value in many cases.

Another outstanding aspect is the high degree of internationalization of our offer contained in our European Masters' Degrees endorsed with the Erasmus Mundus or European Institute of Technology of the European Commission label, double international degrees given totally or partially in English in around 30 Masters' Degrees.

Collaboration with academic, scientific and business institutions also characterize a large part of the degrees described here. Joint degrees with other universities, both Spanish and foreign are included, as are practices, stays, the preparation of a joint Masters' Degree theses and cooperation with significant companies in the industrial sectors.

Finally, it is important to highlight that an additional characteristics is the use of new techniques in educational innovation, an excellent virtual campus, the availability of 'online' material of great value and very advanced technologically or the magnificent libraries and digital archive at the UPM, as an additional support to the students.

Almost 5,000 students carry out postgraduate studies at our university to complete satisfaction as shown by our quality controls, as well as the high degree of value given by companies that demand our graduates. Our postgraduate students are oriented to a very diverse range of profiles: those who wish to continue their training at the UPM or those experiencing it for the first time: new graduates who are looking for the professional enablement of becoming a superior engineer or one with a specialization, professionals seeking complementary up-to-date training in order to improve their work expectations or reorient their university studies, even engineers without a degree who require a technological training to promote their performance. In short, students of different ages, qualifications, experience and needs who will find in the UPM a sound ally in their training throughout their professional life. In agreement with Ortega and Gasset, we propose that in thinking together "it is only worth progressing when we think big, it is only possible to advance when we look afar".

In this sense, we would like this publication to be a useful, simple and effective instrument for potential students to be able to discover a training which allows them to channel their concerns and needs. It is also a guide for employers to help them in the identification of the most suitable professionals for their businesses at the UPM.





Official Masters' Degree Studies  
2014-2015

Engineering the Future

Guarantee of Quality

On Campus

Madrid, one of the best places to study

*Architecture and Building*

*Biotechnology*

*Sciences*

*Sports Sciences and Education*

*Management and Organization*

*Industry and Energy*

*Aerospace Engineering*

*Agro-forestry Engineering*

*Civil Engineering*

*Naval Engineering*

*Information and Communications Technologies*

The experience of the students

Did you know that the UPM



CAMPUS  
DE EXCELENCIA  
INTERNACIONAL  
INTERNATIONAL  
CAMPUS OF EXCELLENCE

UNIVERSIDAD POLITÉCNICA DE MADRID

POLITÉCNICA

# Engineering the future

The *Universidad Politécnica de Madrid* (UPM) is the largest academic institution in Spain in the field of technology. A European benchmark for its teaching and research work, it has been awarded the double seal as an International Campus of Excellence, recognition that endorses the quality of the programs developed in its lecture rooms and laboratories.

More than 40,000 students are trained at the UPM in a wide range of disciplines, which range from Engineering to Sports Sciences to Architecture and Fashion Design. The demands of the syllabus facilitate their future incorporation into the work market and are supported by the close relationship that the institution maintains with the business world.

The UPM is the leader in Spanish university participation within the 7th Framework Program from the European Union for Research and Technological Development. More than 3,000 researchers work in its different centers, in which there is a commitment to transforming the knowledge into advances applied to the productive sector.



▶ VIDEO "Discover the UPM in three minutes"



# Guarantee of Quality

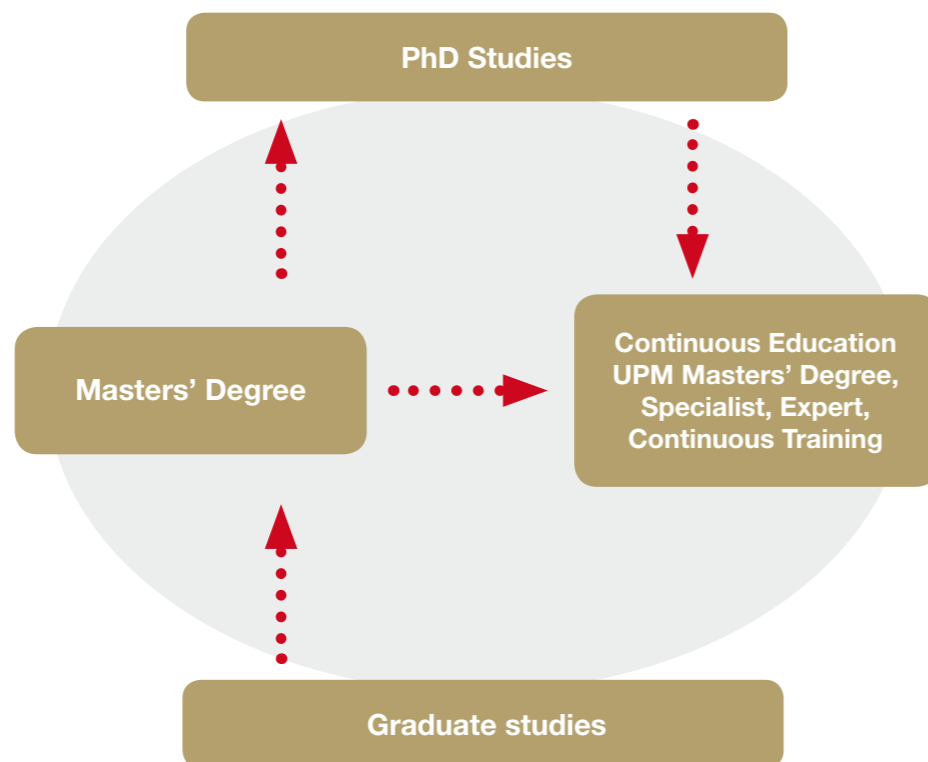
As a continuation of its undergraduate studies, the UPM offers an extensive range of postgraduate programs, including official subjects (University Masters' Degree and PhD) as well as its own qualifications. These are studies that respond to the needs and demands of all of the universities that wish to extend their training with a Guarantee of quality.

The map of official degrees at the UPM includes the following specific Masters' Degrees:

- University Masters' Degree in Teacher Training in Obligatory Secondary Education *Specializations in Physical Education and Technology*
- University Masters' Degree in Aeronautical Engineering
- University Masters' Degree in Agricultural Engineering
- University Masters' Degree in Engineering of Roads, Canals and Ports
- University Masters' Degree in Mining Engineering
- University Masters' Degree in Forestry Engineering
- University Masters' Degree in Industrial Engineering
- University Masters' Degree in Naval and Oceanic Engineering
- University Masters' Degree in Telecommunications Engineering

The University Masters' Degree courses offer the students and advanced specialist or multidisciplinary training, with an academic, research or professional orientation. This series of official studies, which can lead to later PhD studies, includes those specific subjects that make it possible to work in regulated professions.

An overall vision of the courses given at the UPM



## Teaching experience

A historical benchmark for engineering and architecture teaching in Spain, the UPM has very prestigious teachers in their respective fields. The teaching experience is enriched using educational innovation techniques which lead to greater quality in the training received by the students.





## Erasmus Mundus

is a program from the European Unión which offers grants to students and teachers from third countries to carry out postgraduate studies at European universities. It is also offered to students who wish to extend their studies at one of the associated institutions around the world

### ▶ Erasmus Mundus University Masters' Degree



## Internationalization

is one of the pillars of the Postgraduate Programs of the UPM. Designed to facilitate the incorporation of students and teachers from other countries, it opens up to the students the possibility of studying and work practice abroad. This strategy also responds to the growing number of Official Masters' Degrees given in English.

### ▶ University Masters' Degrees offered in English

## Without Borders

More than a third of the Masters' degree students at the UPM are Spanish who are not from Greater Madrid. Another third are from other countries.



## Admission requirements

In order to study the University Masters' Degree at the UPM, it is necessary to have an official Spanish graduate degree or equivalent awarded by an institution from within the European Higher Education Area (EEES). Those students with degrees awarded from education systems from outside the EEES may also have access without having to have their studies officially recognized, once the UPM has checked that they are accredited at the level of training requested.

### ▶ Admissions process

## Branches of knowledge

The UPM has more of 70 Master's Degree qualifications which cover the most relevant technological areas for the advance of modern societies

- Architecture and Building
- Biotechnology
- Sciences
- Sports Sciences and Education
- Management and Organization
- Industry and Energy
- Aerospace Engineering
- Agro-forestry and Environmental Engineering
- Civil Engineering
- Naval Engineering
- Information and Communications Technologies

### ▶ Masters' programs

## Credits

The content of the University Masters' degree studies varies from between 60 and 120 ECTS Credits, equivalent to one or two academic courses.

## Cost

The Greater Madrid government annually establishes a **price for public enrolment** for University Masters' Degree studies within limits, which is available at the University Coordination Council (*Consejo de Coordinación Universitaria*).



# On campus

Living a University life is much more than studying. The UPM offers extracurricular activities which promote culture, sports, teamwork and a spirit of solidarity.



## Cultural activities

The UPM develops an intense cultural activity, both of an institutional character and at the initiative of the students. The highlight of its musical program is the organization of a series of concerts at the Auditorio Nacional together with a music concerts at its centers. Other cultural events include the 'Culture Classroom' and the 'Didactic Saturdays' for the youngest. There is also a Theatre Festival and a 'Certamen de Tunas' (Students dressed in 17th century costumes singing songs from the time) held every year.

## Sporting spirit

The UPM promotes the carrying out of sports activities, which offers teachers, researchers, students and the administrative and services staff the opportunity to carry out numerous sports activities. There are sports activities available at the different centers, including those at the Campuses of Montegancedo and Sur, adapted for people with reduced mobility. Its 20 sports clubs, one at each center, stimulate the enjoyment of sport. Every year the UPM has an immense participation in the Spanish University Championships, its success measured by the large number of medals won.



# Madrid, one of the best places to study

The capital of Spain is one of the cities preferred by universities from all over the world



"When you get to know Madrid, it is the most Spanish city of all, the most pleasant place to live, with the nicest people, and, month after month, the best climate in the world"

ERNEST HEMINGWAY, Nobel prize for literature 1954



**Madrid** is one of the most preferred international destinations for university studies. Young people from all over the world choose the Spanish capital for its culture, vitality and the quality of its universities such as the UPM. This is amply demonstrated by the Best Student Cities 2015 Ranking, which highlights Madrid as one of the 50 best cities in which to study

VIDEO "Choose... Madrid"



"I think I have come to be one more Madrileño\*, something which in Madrid is possible. (\*An inhabitant of Madrid)

One of the great charms of Madrid is that it is a city for everyone"

MARIO VARGAS LLOSA  
Nobel Prize for Literature 2010





OFFICIAL MASTERS' DEGREE STUDIES AT THE UPM

# Architecture and Building

The UPM has one of the oldest and most prestigious schools in Spain in the area of architecture and building characterised by an outstanding international character and which is responsible for the training of professionals of undoubtable prestige.

Its range of Masters' Degrees presents a wide range of studies which cover essential professional areas of great impact such as construction, structures, management, innovation, urbanism, conservation and restoration, among others. The coherence and consistency of its content and skills, together with the quality of its teaching and facilities, place the UPM as a benchmark in this area. In particular, it includes a Masters' Degree which enables the graduate to work as an architect; a natural continuation and linked to the corresponding degree.

OFFICIAL MASTERS' DEGREE STUDIES AT THE UPM

## Architecture and Building

- Analysis, Theory and History of Architecture
- Preservation and Restoration of Architectural Heritage
- Construction and Architectural Technology
- Design of Facilities
- Building Structures
- Management in Building
- Technological Innovation in Building
- Urban and Territorial Planning – Specializations in Urban Studies and Urban Planning
- Advanced Architectonic Projects





# Analysis, Theory and History of Architecture



Teaching Center: School of Architecture  
Credits: 60 ECTS  
Languages: Spanish and English  
Orientation: research and academic  
Places: 30

This Masters' Degree responds to the training content and research included in the area of knowledge called 'Architectonic Composition'. It brings together theoretical, analytical, critical and historical aspects of architecture which allows advances in its depth of knowledge, therefore assuming an essential support for the creation of the current architecture. Furthermore, it serves as a basis for the preservation and restoration of architectonic heritage, the historic city and cultural landscapes.



The program is divided into two specific modules which set out the fields of academic and research dedicated to 'Contemporaneous Architecture' and 'Architecture and Heritage', complemented by a third, instrumental and transversal, with specialized training content.

More information

composicion.arquitectura@upm.es  
(+34) 91 336 65 15

WEB

# Preservation and Restoration of Architectural Heritage



Teaching Center: School of Architecture  
Credits: 60 ECTS  
Languages: Spanish and English  
Orientation: professional and academic  
Places: 60

This Masters' Degree is of an interdepartmental character oriented to specialization training. Its objective is to improve the preparation of the technicians – not only architects – who, in one way or another, are involved in architectonic heritage or who have management tasks or responsibility for it. This preparation does not only aim to be only of a technical nature but also especially in the setting out of criteria which take another look at its current relevance.



One of the training objectives is the preparation in working in interdisciplinary work groups, an aspect which is of essential value in the involvement in architectonic heritage. The Masters' Degree is set out as an integral training unit, with no specializations.

More information

masterpatrimonio.arquitectura@upm.es  
(+34) 91 336 44 06

WEB



# Construction and Architectural Technology



Teaching center: School of Architecture  
Credits: 60 ECTS  
Languages: Spanish and English  
Orientation: professional and academic  
Places: 50

The objective of the Masters' Degree is the training of experts in the field of research into construction materials, constructive systems, the management of resources and energy, bioclimatic design, economic regulation and analysis of the building and heritage process.



The training offered by this Masters' Degree prepares the graduates to carry out research work in the future, both in an academic environment and in the R&D&I departments of private companies and public organizations.

## More information

alfonso.garciasantos@upm.es  
(+34) 91 336 42 46

WEB

# Design of Facilities



Teaching Center: School of Architecture  
Credits: 60 ECTS  
Languages: Spanish and English  
Orientation: professional and academic  
Places: 60

The objective of the Masters' Degree is the training of students in the field of research into the design and calculation of facilities, together with their integration into architecture.



This training will prepare graduates to carry out research work in the future both in an academic environment and in the R&D&I departments of private companies and public organizations. Their skills, therefore, will be both academic and those necessary for research in the university itself and its research centers together with that for applied research in a business environment.

## More information

alfonso.garciasantos@upm.es  
(+34) 91 336 42 46

WEB



# Management in Building



Teaching Center: School of Architecture  
Credits: 75 ECTS  
Languages: Spanish and English  
Orientation: professional and research  
Places: 75

The project of a structure is a task which is made up of different steps and it is essential to evaluate the problem at each of them, to study the possible solutions and make decisions. Firstly, the choice of the types of structure and materials for the preliminary plan of the structure for the specific problem (home, car park, sports or meeting centers, etc.). The next step is the application of the methods of analysis and the numerical calculation tools for the project and dimensions of the different elements. This is followed up by the drawing up of the specifications and construction plans. Finally, it is also essential to consider the analysis and specialist's report on the structures constructed both for modern structures and those of historical heritage.

This Masters' Degree provides a training which allows a project and the calculation of complex structures to be dealt with confidently as well as studying the interaction between structure and architecture in greater depth. A period of essential specialized training in the field of research will be provided so as to begin any original work. The character, essentially non-routine yet creative, of the process that the structural project has, has the advantage of preparing the future researcher for enquiry and critical thinking tasks.

More information

master.estructuras@gmail.com  
(+34) 91 336 42 51

WEB

# Building Structures



Teaching Center: School of Building  
Credits: 60 ECTS  
Languages: Spanish and English  
Orientation: professional  
Places: 60

The Masters' Degree in Building Management is a program that brings together different specific areas involved in building with the aim of training professionals in skills to take on both current and future changes which are leading the building sector towards a new universally planned scenario.

The aim of this program is the qualification of a skilled professional to guarantee the management of a building process from the perspective of the integration of the different agents taking part. This objective is achieved through a training which leads to the mastering of all aspects of the building process.

More information

subdirector.idp.edificacion@upm.es  
(+34) 91 336 32 53

WEB



# Technological Innovation in Building



Teaching Center: School of Building  
Credits: 60 ECTS  
Languages: Spanish and English  
Orientation: professional and research  
Places: 60

The Masters' Degree in Technological Innovation in building offers two itineraries: one professional, which consists of 60 ECTS, and another of research also of 60 ECTS, which will provide access to PhD studies. The Masters' Degree program presents therefore common credits between both orientations and responds to new training demands.

The program integrates in its professional itinerary all of the technological disciplines that come together in the building process. Its research itinerary offers advanced specialization techniques together with the learning of methodologies and tools which will allow PhD students to resolve complex aspects both in the project phase of the PhD thesis and in its implementation, drawing up and exploitation.

More information

subdirector.idp.edificacion@upm.es  
(+34) 91 336 32 53

WEB

# Urban and Territorial Planning (Specializations in Urban Studies and Urban Planning)



Teaching Center: School of Architecture  
Credits: 60 ECTS  
Languages: Spanish  
Orientation: professional and academic  
Places: 60

This program, outstanding for its training, along an accredited trajectory is enjoying a growing volume of acceptance in the academic world. Proof of this is the demand for

enrolment and the growing involvement of public organizations and both private and public companies in the program. It substitutes the Masters' Degree in Urban and Territorial Planning which forms part of the official Postgraduate Studies in Architecture program of the Department of Urban and Town Planning at the Technical High School of Architecture. This Masters' Degree in turn substitutes the University Masters' Degree in Urban Planning given during the 2005-2006 and 2006-2007 academic years.

The syllabus offers two specializations: one professional, by means of the Urban Planning itinerary, and another academic, by means of the Urban Studies itinerary. At the same time the latter specialization allows access to the organized research period of PhD studies. As its equivalent role as training in the third cycle, the proposed qualification substitutes the PhD program in Peripheries, Sustainability and Urban Vitality, which is of great demand due to its wide international renown.

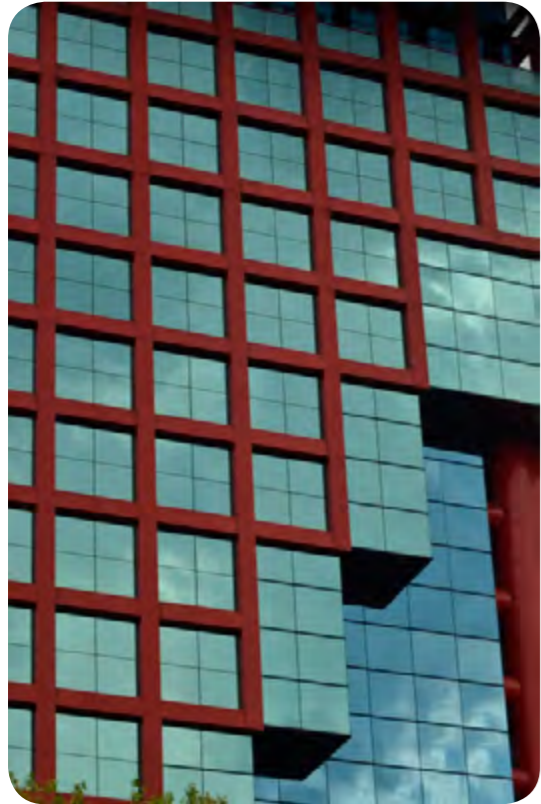
More information

masterplaneamiento.arquitectura@upm.es  
(+34) 91 336 65 08

WEB



## Advanced Architectonic Projects



Teaching Center: School of Architecture

Credits: 50 ECTS

Languages: Spanish

Orientation: research and academic

Places: 50

directed at the qualitative improvement in the architectonic project and its capacity to anticipate possibilities and necessities.



In this context, the social need for this Masters' Degree comes from the evident requirement to continue researching the social and pedagogical demands that make these new project and constructive technology strategies possible. Its objective is to obtain a greater efficiency and competitiveness, as well as trying to maintain the internationally renowned high prestige of Spanish architectonic production and especially that coming from the Technical High School of Architecture of Madrid.

Architecture plays an essential role in the working and wellbeing of society: in its accommodation and that of its institutions in social and economic development, in industry and employment. It is in the drawing up of architecture and building projects in which the material support of the social task is defined. The quality of the projects –its formal adaptation, spatial, functional, material, constructive, technical and technological– is therefore a key element. Its function as an instrument which optimizes the constructive processes and the implementation and maintenance of materials, products and energies, is enough to justify the research and teaching effort

### More information

master.proyectos.arquitectura@upm.es  
(+34) 91 336 65 33

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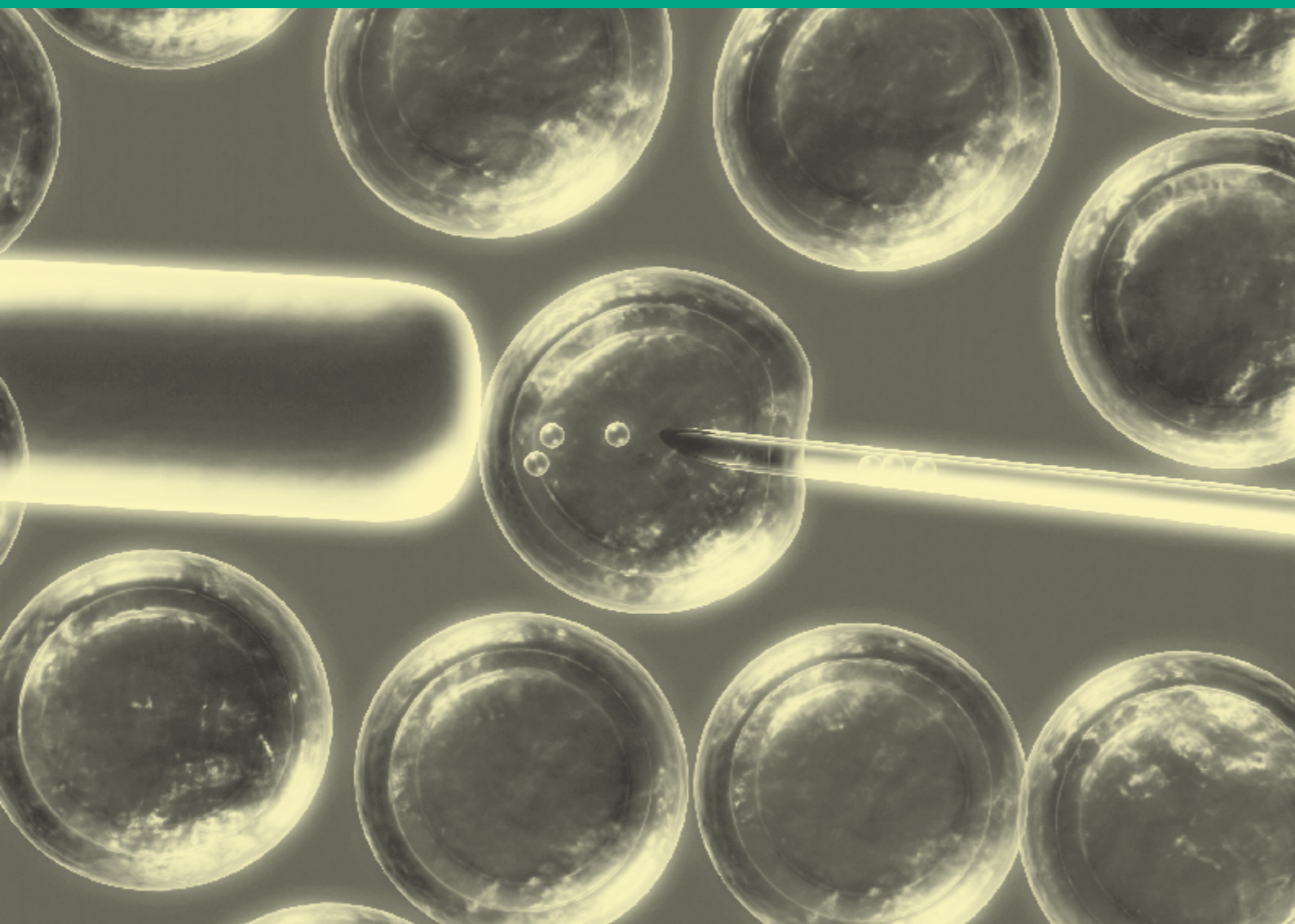
# Biotechnology

The great capacity of the UPM in a wide variety of subjects allows the range of Masters' Degrees to be completed with studies in an interdisciplinary environment, as is Biotechnology, in which it is essential to

combine the technological aspects with the scientific ones. Therefore, biotechnology is in an ideal situation at the UPM to allow professionals to be trained who, beyond a sound basic knowledge, know how to develop and apply it with advanced technological principles that reinforces the applied and practical component. Areas such as genetics or food engineering are on offer both to engineers as well as other graduates in areas similar to the field of Biotechnology.

## Biotechnology

- Agricultural and Forestry Biotechnology
- Food Engineering Applied to Health
- Biomedical Engineering





# Agricultural and Forestry Biotechnology



Teaching Center: School of Agricultural Food and Biosystems Engineering

Credits: 30 ECTS

Languages: Spanish and English

Orientation: professional and research

Places: 25

**The Masters' Degree is directed to graduates in experimental sciences and engineering. Its main objective is the training of professionals in new biotechnological and genomic tools applicable to the agro-forestry and**

**food sector as well as research into the molecular biology of plants and microorganisms. The students obtain skills for the identification of scientific objectives, the design of experiments, critical analysis of the results and the drawing up of reports on the conclusions. The Masters' Degree also offers the option of training in the management of biotechnological businesses and legal aspects related to biosecurity, intellectual protection or the evaluation and commercialization of related technologies. This professional training will be completed with the possibility of carrying out work practice in companies in these sectors in the bio-economy.**

The Masters' Degree offers the students the opportunity to acquire knowledge, skills and abilities to successfully take on research tasks in agro-forestry biotechnology, professional tasks in companies in the biotechnology sector, and evaluation and transfer of the results from research to the productive sector. It is linked to the official PhD Program in Biotechnology and Genetic Resources of Plants and Associated Microorganisms of the UPM, distinguished with the 2011-0295 Citation of Excellence from the Ministry of Education and evaluated positively by ANECA in July 2013, for its adaptation to the new PhD regulation (RD99/29011).

More information

master.biotechnologia.agronomos@upm.es  
(+34) 91 336 57 69

WEB

# Food Engineering applied to Health



Teaching Center: School of Agricultural Food and Biosystems Engineering

Credits: 60 ECTS

Languages: Spanish

Orientation: professional and research

Places: 25

Hippocrates wrote: "Let food be your only medicine". The interactions between health and food are very intense and with a profound influence on the quality of life, especially in the medium and long term. Society's interest in the type of food it consumes is increasing as is the processing and how it affects it. At the same time, industry perceives these concerns and incorporates them into their productive processes. This Masters' Degree aims to train experts capable of offering solutions in the area of food and their repercussions on health.

**The objectives of the Masters' Degree are:**

- To provide a multidisciplinary training in areas related to food and the health of society.
- To evaluate and apply the current methodologies in the area of food manufacture, consumption and health.
- To promote coordination between universities and R&D&I centers with businesses from the sector as well as the relevant public administrations.
- To train specialists capable of participating in research, development and innovation in the health and food sector.

More information

salina.agronomos@upm.es  
(+34) 91 336 57 45

WEB



# Biomedical Engineering



Teaching Center: School of Telecommunications Engineering and Center for Biomedical Technology (CTB)

Credits: 60 ECTS

Languages: Spanish and English

Orientation: professional, research and academic

Places: 40

The University Masters' Degree in Biomedical Engineering offers an interdisciplinary training in one of the areas of engineering with the greatest growth and professional demand. With a scientific-technical orientation in engineering, it incorporates the fundamentals of biomedical disciplines and includes a wide variety of professional profiles for industry, health institutions and research centers in biomedical engineering. It also encourages the students to analyze, summarize and innovate in biomedical problems, with the ultimate objective of qualifying them to work in teams in interdisciplinary work (engineers, clinicians, administrative work) as well as the end users (doctors and patients).

- The Masters' Degree is based on more than 25 years of extensive teaching and research experience in Biomedical Engineering of the teachers, departments, research and teaching centers in this field. A total of 41 teachers from the UPM participate (13 Full Professors, 22 Associate Professors, 6 PhD Professors), as well as around twenty teachers invited from other universities, hospitals and companies. The program, which is structured into the fundamental subjects in Biomedical Engineering, offers two specialization itineraries: one, telemedicine and biomedical imaging; and another, biomaterial and biomechanical devices.

## More information

[master.ib@gbt.tfo.upm.es](mailto:master.ib@gbt.tfo.upm.es)

(+34) 91 549 57 00 - extensión 34 07

WEB





# Sciences

The UPM completes its range of more classic engineering with a series of Masters' Degrees which, without forgetting the markedly technical nature of the university, allows professionals to be trained in areas with components from the classic sciences.

Materials and Mathematics are interrelated with engineering in a series of qualifications which, at the same time as training professionals of prestige and quality, allow them to advance and prepare themselves for the technologies which in the future will be keys to some of the fields of national and international engineering.

## Sciences

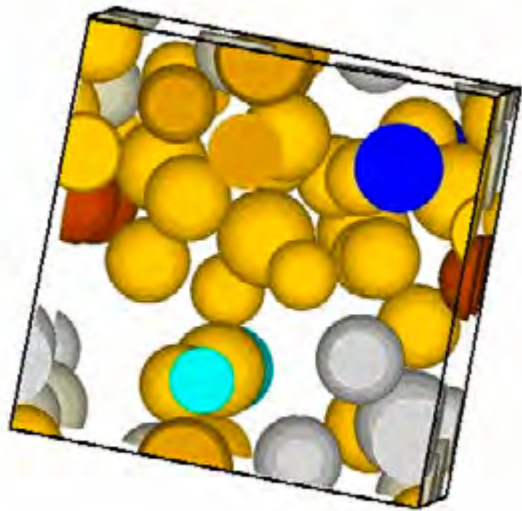
Material Engineering

Statistical and Computational Information Processing





## Material Engineering



Teaching Center: ETSI Caminos, Canales y Puertos

Credits: 72 ECTS

Languages: Spanish and English

Orientation: professional

Places: 50

Most of the Masters' Degree course is given in English, with the possibility of obtaining the 72 established credits in this language. This opens the program up to students from all over the world, since it is not necessary to speak Spanish to do the course. Furthermore, it gives rise to interesting agreements with other foreign academic centers such as the University of and California (Berkeley) or the State University of Pennsylvania, at which the Final Masters' degree project may be carried out, likewise a double degree agreement with Beihang University (Beijing).



### More information

master@mater.upm.es  
(+34) 91 336 52 41

WEB

The *Universidad Politécnica de Madrid*, pioneer in the implementation of Materials Engineering studies, offers this Masters' Degree which studies the knowledge related to Materials Engineering in depth, which allows its graduates to adapt both rapidly and efficiently to the new technologies, improve the processes of production and management of materials and be able to design and manufacture new ones in a competitive environment. It offers a common training in the most advanced analysis and characterization of materials techniques and four specialized itineraries: structural materials, functional, biomaterials and materials for energy.

## Statistical and Computational Information Processing



Teaching Centers: School of Telecommunications Engineering at the UPM and the Faculty of Mathematical Sciences at the UCM

Credits: 60

Languages: Spanish and English

Orientation: professional and research

Places: 30 (between both universities)

The main objective of the Masters' Degree is to provide an advanced training in the processing of information from a statistical, mathematic and computational point of view. The students obtain the latest knowledge in areas such as data

mining, network theory, Bayesian inference, neural systems, queuing theory, mathematics finance, diffuse information or 'soft computing', among others. The program is given in conjunction with the *Complutense* and *Politécnica Universidades de Madrid*, within the framework of The Moncloa International Campus of Excellence.



The Masters' Degree provides the students with a profile currently much in demand, endowing them with an exceedingly interesting academic specialization from the professional point of view. It also provides an initiation into research tasks as it enables the graduates to complete their studies by studying for a PhD. Independently of their being recent graduates or coming from the work market, the purpose is to offer the students attractive postgraduate studies, with a future, and which responds to their professional and research expectations.

### More information

francisco.ballesteros@upm.es  
(+34) 91 336 72 83

WEB



OFFICIAL MASTERS' DEGREE STUDIES AT THE UPM

# Sports Sciences and Education

From its center in Spain, pioneer in the teaching of these subjects, the UPM proposes a sound, coherent and complete range within this area, giving complete satisfaction both to the social and work demands, not only for its

graduates but also other qualified people who wish to complete their education thus increasing their expectations for work through high quality training. This range of Masters' Degrees enables the graduate to carry out their profession as a secondary education teacher in different areas (physical education, technology and drawing).

OFFICIAL MASTERS' DEGREE STUDIES AT THE UPM

## Sports Sciences and Education

DEGREE FOR A SPECIFIC PROFESSION

Teacher Training in Obligatory Secondary Education  
(Specialization in Physical Education and Technology)

Sciences of Physical Activity and Sports

Management of Organizations and Facilities for Physical Activity and Sport





## Teacher Training in Obligatory Secondary Education (Specialization in Physical Education and Technology)



The Masters' Degree, which offers specializations in Physical Education and Technology, has the objective of facilitating an integral training enabling the graduate to carry out the profession of a teacher of Compulsory Secondary Education (ESO), Baccalaureate and Professional Training. The degree entitles the graduate to work as a teacher of secondary education in private institutions and is an essential requirement for participating in calls and civil service exams for access to public institutions. Therefore it is directed to currently qualified people, engineers and university graduates who wish to dedicate themselves professionally to teaching in Secondary Education, Baccalaureate and Professional Training.

### More information

master.fprof@upm.es  
(+34) 91 452 49 38

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### DEGREE FOR A SPECIFIC PROFESSION

Qualification enabling the graduate to carry out of the regulated professions of a Compulsory Secondary Education Teacher, Professional Training and the Teaching of Languages.

Teaching Centers: ICE, Faculty of Sciences for Physical Activity and Sport (INEF) and School of Aeronautics and Space Engineering  
Credits: 60 ECTS.  
Languages: Spanish  
Orientation: professional  
Places: 35

The Masters' Degree consists of three modules:

#### Module 1

Generic, in which general aspects of teaching in Secondary Education are dealt with. The course is given in the lecture rooms of the ICE by teachers from the ICE.

#### Module 2

Directed at the specialization in the teaching of Physical Education and Technology. The former is given by teachers from the Faculty of Physical Activity and Sports in the lecture rooms of this center. The latter specialization is given at the Technical High School of Aeronautics and Space Engineering by teachers from different centers at the UPM.

#### Module 3

'Practicum' which includes external work practice at educational centers in Greater Madrid together with the carrying out of a final Masters' Degree project.

## Sciences of Physical Activity and Sports



The main objective of the Masters' Degree is to endow future researchers in the field of physical activity and sport with the knowledge, skills and abilities necessary to achieve a PhD in Physical Activity and Sports Sciences. Specifically, to ensure that the students reach an up-to-date and high level training for research in this field of knowledge.



The structure of the Masters' Degree is divided into three modules. The first, which is compulsory (22 Credits), has the objective of training in the subjects necessary to be able to carry out research (quantitative and qualitative), as well as the procedure for the drawing up and publication of the results.

Teaching Center: Faculty of Sciences for Physical Activity and Sport (INEF)

Credits: 60 ECTS

Languages: Spanish and English

Orientation: research and academic

Places: 35

The second module (18 Credits) –made up of a total range of 16 optional subjects, from which the student must choose 6– ensures that the students direct their preferences in the field of research from the following itineraries: Education, Management, Performance and Leisure-recreation. The third module (20 Credits) is made up of the presentation and public defense before a panel of experts of a Masters' Degree project, drawn up under the supervision of a teacher.

### More information

vicedecano.investigacion.inef@upm.es  
(+34) 91 336 40 20 (+34) 91 336 40 59

WEB



## Management of Organizations and Facilities for Physical Activity and Sport



Teaching Center: Faculty of Sciences for Physical Activity and Sport (INEF)  
Credits: 60 ECTS  
Languages: Spanish  
Orientation: professional  
Places: 45

To train the managers required by businesses, clubs, and public entities for physical activity and sport is the mission of this Official University Masters' Degree as well as all of its prestigious team of academic teachers, which brings together the best specialists from the three participating universities: *Politécnica de Madrid, Alcalá de Henares and León.*

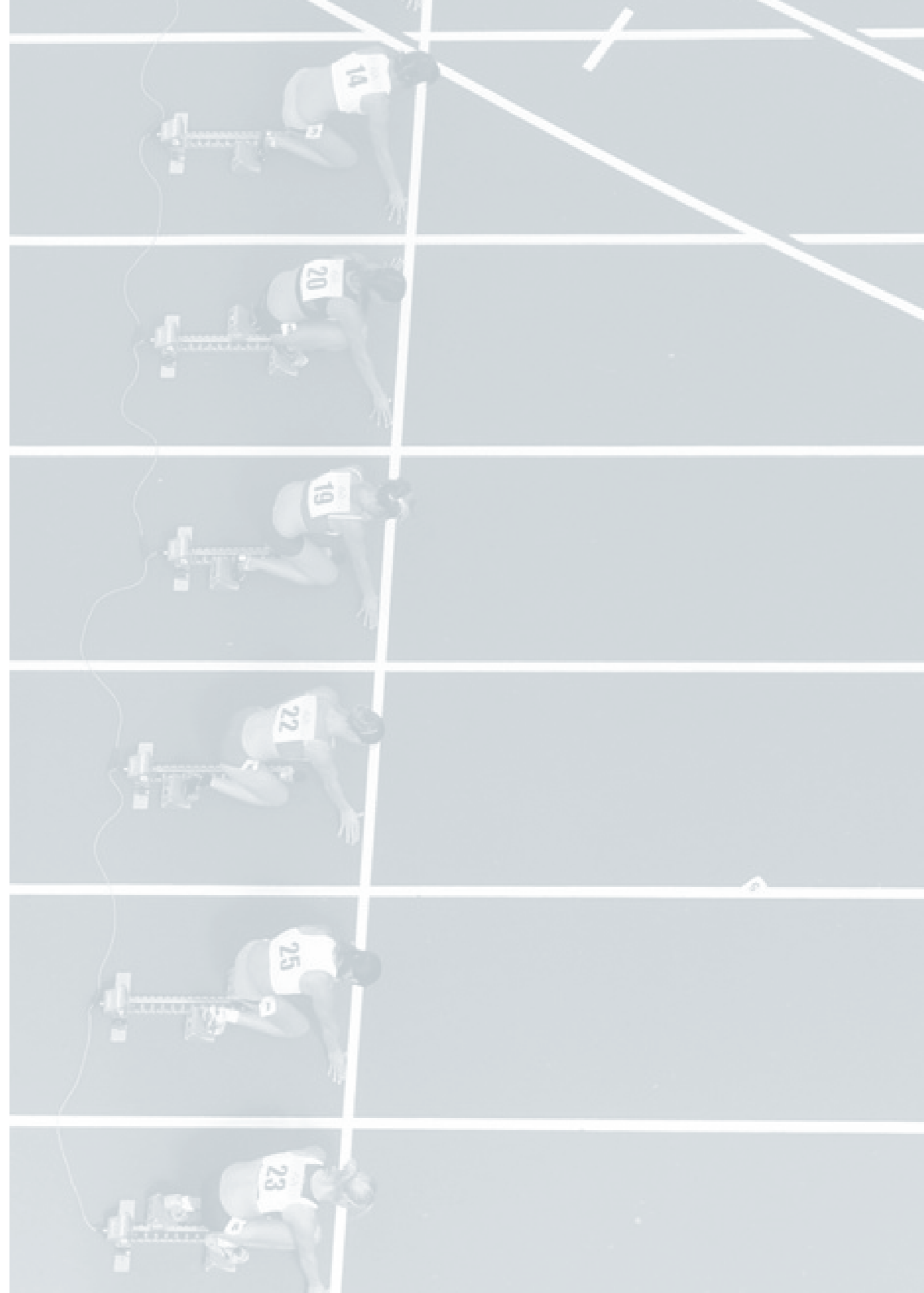
The main abilities that the students will acquire are:

- To analyze every situation critically and fundamentally, resolve complex problems that require the use of creative and innovative ideas and develop new solutions in sports entities and facilities.
- To work efficiently in cooperation with other people in different types of organization by means of the development of negotiation skills, communication, interpersonal relations and leadership.
- To develop habits of excellence and professionalism in the different types and contexts in the management of sports entities and facilities.
- To master the new technologies autonomously in any process and context in the management of physical activity and sport, as well as sports facilities.

More information

[vicedecano.investigacion.inef@upm.es](mailto:vicedecano.investigacion.inef@upm.es)  
(+34) 91 336 40 20

WEB





# Management and Organization

The sound range of Postgraduate studies at the UPM in the classic areas of engineering must be combined with a complementary range and, in many cases, essential, for the professional practice of the engineers as is

the area of management and organization. The marked interdisciplinary nature of these qualifications provide the graduates with a high value training adapted to the area of engineering which will allow them to take on tasks of great responsibility and with a wide spectrum of industrial work.



## Management and Organization

Economics and Innovation Management

Engineering Management

Project Planning in Rural Development and Sustainable Management

Technology for Human Development and Cooperation





# Economics and Innovation Management



Teaching Centers: School of Industrial Engineering (UPM), Faculty of Economic and Business Sciences (UAM) and Faculty of Economic and Business Sciences (UCM)

Credits: 60 ECTS

Languages: Spanish and English

Orientation: research

Places: 36

The objective of the Interuniversity Masters' Degree in Economics and the Management of Innovation is to contribute to the development of research in areas related to innovation and its practical

application in business and public organizations. It has been developed by the INNOPRO research groups from the Universidad Politécnica de Madrid; PRIME-UAM, from the Universidad Autónoma de Madrid; and GRINEI, from the Universidad Complutense de Madrid. The participation of researchers from these three universities, from different yet complementary areas allows the different aspects related to technological change and innovation to be dealt with a multidisciplinary focus, which promotes quality teaching and research management from both the micro and macroeconomic point of view as well as complementing the technical vision of the innovation process with a financial grasp.

This program, which obtained the Citation of Quality from the Ministry of Education and Science for the period 2006-2009, is coordinated with the PhD program in Economics and The Management of Innovation, also distinguished with the Citation of Excellence from the Ministry of Education.

## More information

innopro@etsii.upm.es  
(+34) 91 336 32 10

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# Engineering Management



This Masters' Degree trains expert professionals in the area of Organizational Engineering, dealing with the knowledge necessary to design and manage complex organizations. With this objective, advanced organizational engineering knowledge and techniques are combined with the skills necessary for the management, organization and management of people, production, logistics, project management, financial decisions and the assignment of resources for the efficient resolution of problems. Furthermore, as part of the commitment to integral training, subjects are offered to endow the students with communications and management skills and abilities.

Teaching Center: School of Industrial Engineering

Credits: 120 ECTS

Languages: Spanish and English

Orientation: professional, academic and research

Places: 50

The Masters' Degree students have the possibility of carrying out exchanges with foreign academic centers together with double degree agreements with the Technological Institute of Illinois (Chicago) and the Polytechnic of Milan. There is also the option of carrying out work practice in companies. The engineers trained in this Masters' Degree are able to access technical and managerial posts in production and service companies. Strategy and planning, production organization, purchasing logistics or project management posts are just a few examples of the areas of application of the professionals that we train.

## More information

mio.industriales@upm.es  
(+34) 91 336 3207

WEB



## Project Planning in Rural Development and Sustainable Management



Teaching Centers: School of Agricultural Food and School of Forestry Engineering and Natural Resources  
 Credits: 60 ECTS  
 Languages: Spanish and English  
 Orientation: Research  
 Places: 20

The general objective of the Masters' Degree is to prepare researchers in the field of planning projects in rural-local development and the sustainable management of territories. The course is given in coordination with two research groups from the UPM: GESPLAN and SILVANET. The program is open to graduates from any country: from the first edition in 2009-2010 more than 70% of the students came from outside Spain. For this reason, the Masters' Degree constitutes a strategic and practical instrument for the progress of rural areas on the planet, especially in developing countries. It offers interesting agreements by means of a stable collaboration network with universities in Latin America (Ecuador, Peru and Mexico), where the Masters' Degree thesis may be carried out.

The Masters' Degree may also be studied as a joint *Erasmus Mundus* European qualification, within the *AgrisMundus* - Sustainable Development in Agriculture Master of Sciences Masters' Degree program. This is a high level Masters' Degree in Agriculture, Development and the Sustainable Management of Natural Resources, oriented to tropical areas and developing countries ([www.agrismundus.eu](http://www.agrismundus.eu)).

More information

[mdrgs.agronomos@upm.es](mailto:mdrgs.agronomos@upm.es)  
 (+34) 91 336 39 86

WEB

## Technology for Human Development and Cooperation



Teaching Center: School of Agricultural Food and Biosystems Engineering  
 Credits: 90 ECTS  
 Languages: Spanish and English  
 Orientation: professional and research  
 Places: 60

The objective of the Masters' Degree is to train professionals in the identification and application of points of focus and solutions of a technical and social orientation to problems of human development. The training is linked to cooperation groups and to the Center for Innovation in Technology for Human Development at the UPM. It includes, among others, subjects of territorial and urban development, agriculture, forestry and basic services (water, light, energy, communications, information and communications technology), considering sustainable development and the environment. One semester is dedicated to training in the field, thanks to mobility agreements with foreign organizations.

The graduates of this Masters' Degree will be able to intervene, in a diverse and multidisciplinary context, in an informed, rigorous and pertinent nature in the identification, planning, management, implementation and evaluation of policies, programs or projects that apply technological innovation to human development. They will be capable of establishing specifications and objectives of technical innovation appropriate to the conditions required in the less favored sectors, basing them on promotion and extension of previous capacities. They will develop their activity in NGOs national or international organizations and businesses linked to international cooperation for development.

More information

[master.itd@upm.es](mailto:master.itd@upm.es)  
 +34 91 336 5805

WEB



# Industry and Energy

The UPM has accumulated a long tradition of training professionals who have been and remain the reference in this area. To this background is added research and development activity, transfer of technology, innovation, entrepreneurship and outstanding international collaboration. A range of Masters' Degrees is built on this basis which takes in many areas of specialization

(robotics, design, energy efficiency, seismic, production, mechanics, chemistry, nuclear technologies, sustainability, risk analysis, among others), with a marked multidisciplinary and international nature. Within this range, other distinctive elements appear in these Masters' Degrees which endow for the carrying out of the professions of industrial engineering or mining engineering, likewise the Masters' Degree that complies with the regulations stipulated by the Ministry of Education, Culture and Sport for Chemical Engineering.

## Industry and Energy

DEGREE FOR A SPECIFIC PROFESSION

Mining Engineering

DEGREE FOR A SPECIFIC PROFESSION

Industrial Engineering

Automation and Robotics

Nuclear Science and Technology

Energy Efficiency in Buildings, Industry and Transport

Industrial Electronics

Photovoltaic Solar Energy

Energy Engineering

Electrical Engineering

Electromechanical Engineering

Engineering in Industrial Design

Geological Engineering

Mechanical Engineering

Chemical Engineering

Industrial Mathematics

Sustainable Mining





# Mining Engineering



## DEGREE FOR A SPECIFIC PROFESSION

Qualification enabling the graduate to carry out of the regulated profession of a Mining Engineer

Teaching Center: School of Mining and Energy Engineering

Credits: 120 ECTS

Languages: Spanish

Orientation: professional

Places: 70

The objective of the Masters' Degree is the high level training in knowledge and capacities of future professionals who will carry out their functions in the area of mining and energy, from their sources to their applications in industry and society in general. It consists of training students in the capacities and skills necessary in the following sectors: production, transformation, storage, transport and use of raw materials, energy providing or not, including aspects as regards efficiency and environmental impact. It also consists of training in knowledge and capacities to undertake research, development and innovation in the latest generation of technologies and systems in mining engineering activity sectors.



The syllabus promotes decision making in uncertain environments and allows the acquisition of knowledge and to develop the skills necessary to design and manage complex projects, including the management of human resources, financial aspects, production, logistics, project management and assignation of resources for the effective resolution of organizational problems.

### More information

estudios.minas@upm.es  
(+34) 91 336 70 20

WEB

# Industrial Engineering



## DEGREE FOR A SPECIFIC PROFESSION

Qualification enabling the graduate to carry out of the regulated profession of an Industrial Engineer

Teaching Center: School of Industrial Engineering

Credits: 120 ECTS

Languages: Spanish

Orientation: professional

Places: 200

The Masters' Degree students will acquire the following skills:

- 1 They will be effective in the professional practice of innovation, development, management and application of engineering and will be prepared and committed to lifelong learning.
- 2 They will design and implement creative solutions to engineering problems, evaluating their financial repercussions together with their overall impact on society and the environment. All of this will be a guide to both decision making and an ethical and socially responsible behavior.
- 3 They will be effective in written and oral communication.
- 4 They will efficiently determine the challenges and priorities of the activities to be carried out within the environment of the organization action, deadlines, the resources and the processes for change required to achieve the proposed results.

- 5 They will lead, manage, work and interact effectively in multidisciplinary teams and multilingual and multicultural environments, demonstrating flexibility, the capacity to adapt and with an eagerness to succeed

This qualification, as well as preparing the graduates to carry out their profession as an Industrial Engineer, has the certificate of accreditation from the ABET American agency.

### More information

estudios.industriales@upm.es  
(+34) 91 336 30 60

WEB



## Automation and Robotics



Teaching Center: School of Industrial Engineering  
Credits: 60 ECTS  
Languages: Spanish  
Orientation: professional, research and academic  
Places: 30

The Masters' Degree consists of the in-depth study of two fields of technology in constant evolution: Automation and Robotics. These integrated disciplines in which developments and innovations come together in different areas such as computing sciences, electronics, microsystems or artificial intelligence. Consequently, they are not only interesting in themselves, but they also contribute to the advance in other relevant technologies and scientific areas. After their consolidation in the industrial world, with the massive use of automatic systems and robots in plants and industrial processes, it is giving rise to its demand and incorporation in multiple facets of everyday life.

Although the range is initially with a research orientation, it is important to highlight that the holders of the Masters' Degree work in R&D departments of companies dedicated to automation or robotics. Therefore, the users of these technologies have the capacity both in an academic-research environment and specialized industry. Terms such as intelligent supervision and control, artificial perception, intelligent and applied robotics, are state-of-the-art disciplines in the leading universities in the world and form part of the core training of this Masters' Degree.

### More information

teresa.olmos@upm.es  
(+34) 91 336 30 61

WEB

## Nuclear Science and Technology



Teaching Center: School of Industrial Engineering  
Credits: 60 ECTS  
Languages: Spanish and English  
Orientation: research  
Places: 50

The main objective of this Masters' Degree is the preparation for the development of advanced simulation, design and analysis methodologies in the area of science and nuclear technology, that is nuclear fission and fusion reactors, including questions related to its combustible cycles and safety. The syllabus consists of all of the subjects necessary to research and work professionally in the following areas:

- Development of advanced nuclear fission reactors with new requisites for passive safety systems, combustible, non-proliferation, actinide burning and transmutation of radioactive waste, as well as those of high temperature with industrial applications such as the production of hydrogen.
- Development nuclear fusion systems, in their magnetic confinement and inertial versions, together with the methodologies for their numerical simulation.

- Use of particle accelerators in physical research and their applications in medicine and industry.

The students will benefit from mobility agreements with other European universities with equivalent nuclear programs, with grants from Euratom, which would allow them to obtain a European Masters' Degree.

### More information

eduardo.gallego@upm.es  
oscar.cabellos@upm.es  
(+34) 91 336 31 12

WEB



# Energy Efficiency in Buildings, Industry and Transport



Teaching Centers: School of Mining and Energy Engineering, School of Industrial Engineering, School of Building and The University Institute of Automobile Research (INSIA)

Credits: 90 ECTS

Languages: Spanish

Orientation: professional and research

Places: 40

The Masters' Degree, which has an inter-center syllabus and shared training processes, offers knowledge on the general principles of energy efficiency applied to the world of building, industry and transport, as well as training at the vanguard of techniques for the optimization and improvement in energy systems. The students learn evaluation methodologies and tools, which facilitate the decision making process to undertake the said improvement measures, and increase their capacities to resolve problems in very diverse energy efficiency environments, generally in multidisciplinary contexts.



The Masters' Degree is made up of 90 Credits divided into three modules:

- General module (I) of compulsory common subjects (28 ECTS).
- Intensification module (II), made up of two blocks: one of common intensification (three subjects of 8 ECTS, one of each from three lines of specialization); in the second block. The student will choose a single line of specialization and will study one other subject (of 8 ECTS).
- Practicum' (III): external work practice or introduction to the Masters' Degree thesis work (30 ECTS).

More information

master.eficienciaenergetica@upm.es  
(+34) 91 336 58 64

WEB

# Industrial Electronics



Teaching Center: Center for Industrial Electronics (CEI)

Credits: 60 ECTS

Languages: English

Orientation: research and academic

Places: 50

The Masters' Degree is directed at engineers, technicians and scientists interested in R&D. It does not only provide a complete and exhaustive training in the field of industrial electronics, but it also facilitates access to the business sector in this area, thanks to the close links that the teachers of this the Masters' Degree have with numerous companies. These relationships achieve a technological transfer of the results obtained to industry, be they of short, medium or long term. In this sense, the students will participate in research projects (financed), whose results will not only be useful in the carrying out of their Masters' Degree thesis work, but will also have a clear application in the industrial environment.



Through the Masters' Degree, approved by ANECA with the Citation of Quality, the students acquire a more profound comprehension of the latest advances in this area. Furthermore, they make up a team of researchers at the Center for Industrial Electronics, which carries out activities in the design of electronic equipment applied to different sectors, such as aerospace, health, defense or communications.

More information

yolanda.rodriago@upm.es  
(+34) 91 336 31 91

WEB



## Photovoltaic Solar Energy



Teaching Engineering Center: School of Telecommunications Engineering

Credits: 60 ECTS

Languages: Spanish and English

Orientation: professional and research

Places: 30

The aim of this Masters' Degree is the professional and scientific training of experts in the multidisciplinary field of photovoltaic solar energy. The students acquire the theoretical and experimental training as well as developing communications skills, expression and innovation which are essential both in industry and the academic world. After studying the Masters' Degree, they will be able to evaluate the potential of photovoltaic solar energy and the implications of its proliferation; they will also be able to evaluate critically that advances made in this field and will be able to analyze and design their specific applications.



The Institute of Solar Energy (IES) at the UPM is the oldest institute in the work dedicated exclusively to research into photovoltaic energy and the relevance of its scientific contribution is recognized internationally. Furthermore, the IES has been a pioneer in the university teaching of this technology. Our intention is that our experience in the real world has repercussions on the students, which is why the Masters' Degree has a more hours of laboratory study and work in our photovoltaic infrastructures.

### More information

mariahelena@ies-def.upm.es  
(+34) 91 336 72 31

WEB

## Acoustic Engineering in Industry and Transport



Teaching Center: School of Industrial Engineering

Credits: 60 ECTS

Languages: Spanish and English

Orientation: research

Places: 25

The University Masters' Degree in Acoustic Engineering in Industry and Transport came into being in the 2009-2010 academic year. Its reference was the training period of the PhD in Acoustic Engineering which began in 2001. The UPM is the only university in Spain offering this course. It is oriented to students with a profile in engineering, and graduates interested in acoustic engineering, noise control, environmental acoustics, architectonic acoustics, industrial and work related noise, the applications of ultrasounds and acoustic instrumentation.



In the Masters' Degree, as well as teachers from the UPM, teachers from other Spanish and foreign universities and institutions such as CSIC, the UPC, the UCLM and the Polytechnic of Milan, among others are participating. The program includes 13 subjects per semester which vary from 2 and 5 ECTS, as well as a Masters' Degree thesis equivalent to 15 ECTS which must be developed during the second semester.

### More information

manuel.recuero@upm.es  
ignacio.pavon@upm.es  
(+34) 91 336 46 96 (+34) 91 336 41 53

WEB



# Energy Engineering



Teaching Center: School of Industrial Engineering  
 Credits: 60 ECTS  
 Languages: Spanish  
 Orientation: academic and professional  
 Places: 80

The Masters' Degree offers a high level training in knowledge and capacities to future professionals who will carry out their functions in the area of energy engineering, from its sources to its applications in industry and society in general. It consists of training the students in the capacities and skills necessary for its use in calculation, simulation, design, analysis and auditing in the following sectors: production, transformation, storage, transport and use of energy, with special emphasis on aspects of sustainability, efficiency and the environmental impact of the different forms, applications and management techniques for energy resources.

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**The general objective of the Masters' Degree includes the training in knowledge and capacities in order to undertake research, development and innovation of technologies and innovative systems in the energy sector.**

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### More information

master.energia@etsii.upm.es  
 (+34) 91 336 42 62

**WEB**

# Production Engineering



Teaching Center: School of Industrial Engineering  
 Credits: 60 ECTS  
 Languages: Spanish  
 Orientation: professional and research  
 Places: 40

**The Masters' Degree endows the graduates with the knowledge necessary to carry out leadership roles in the areas of operations and production processes in both industrial and service businesses with the objective of improving their competitiveness**

The graduates will have the characteristic skills of an engineer specialized in industrial production. That is, a multidisciplinary engineer capable of controlling and managing all of the steps of the life cycle of the product: design, manufacture, reengineering, after sales, recycling, withdrawal, etc. The graduate will also be able to plan the tasks and select the most

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suitable technologies for their implementation and control with no negative impact on the environment, efficiently administrating the spaces, continuous improvement and flexibility and adaptation to changing productive contexts. The Masters' Degree also provides the skills necessary to undertake research, development and innovation activities in all aspects of industrial production

### More information

josemanuel.arenas@upm.es  
 (+34) 91 336 77 16

**WEB**



## Electrical Engineering



Teaching Center: School of Industrial Engineering

Credits: 60 ECTS

Languages: Spanish

Orientation: research and academic

Places: 40

The Masters' Degree offers two training itineraries: one oriented to professionals who wish to extend their knowledge in the field of electrical engineering and another, to those who wish to obtain a PhD Degree. In both cases, the content and methodology will be appropriate to the basic knowledge proper to each professional profile and to the related knowledge and skills.



As the Masters' Degree does not prepare the student for the development of a regulated profession, in general the objective is that every graduate remains essentially in his or her generic field of professional activity corresponding to their initial training. The mission of the syllabus is to deal with those packets of training necessary to complement that in accordance with the specific related professional profiles. However, the Masters' Degree may also be of use to help certain students reorient their professional activity.

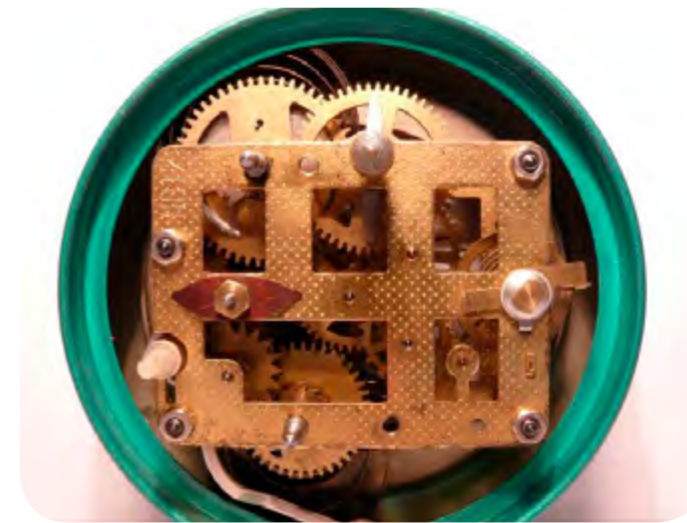
### More information

rosamaria.decastro@upm.es

(+34) 91 336 41 59

WEB

## Electromechanical Engineering



Teaching Center: School of Industrial Design and Engineering

Credits: 60 ECTS

Languages: Spanish

Orientation: professional

Places: 40

robotics, applications for biomedical engineering, integral automation of manufacture and control systems, automation programming or the design and construction of machinery and the manufacture of new products

The Masters' Degree offers quality professional training which integrates mechanical, electrical and electronic technologies and the associated information systems. Furthermore, it offers the possibility of carrying out academic work practice in national and multinational companies. It is structured as a common core subject and two itineraries: **Mechatronics and the Distribution of Electrical Energy.**

The itinerary of Mechatronics leads to an advanced training and qualification in the conception of mechatronic systems, that is, the synergic and multidisciplinary integration of mechanical engineering, electronics and the computerized control for the design and processes. It comprises different fields, such as

- The objective of the itinerary for the Distribution of Electrical Energy is to train experts in the current methodologies and technologies for the planning, design and management of distribution of electrical energy systems. It includes the advanced development of mechanical and electrical designs of lines and distribution networks, the design of earthing installations, the selection of switchgear, protection, insulation and the implications of the distributed generation in the planning and development of distribution networks.

### More information

cecilia.garcia@upm.es

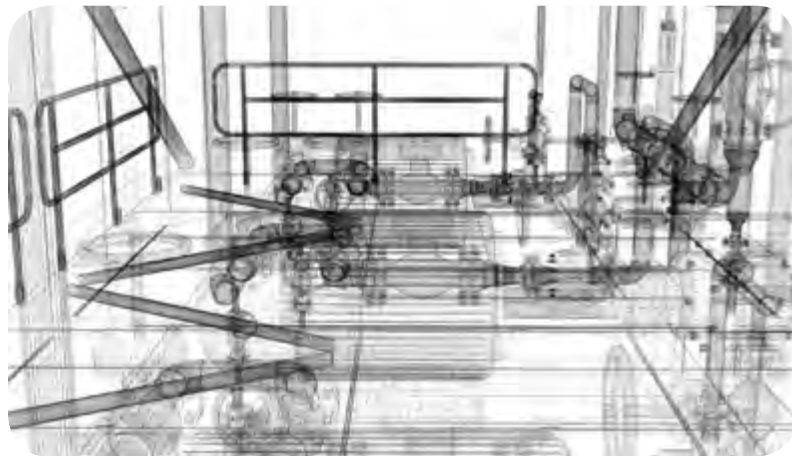
rafael.cascon@upm.es

(+34) 91 336 76 99 / 68 51 / 68 81

WEB



# Engineering in Industrial Design



Teaching Center: School of Industrial Design and Engineering  
Credits: 60 ECTS  
Languages: Spanish and English  
Orientation: professional and research  
Places: 40

The objective of the general Masters' Degree is to provide the students with the knowledge necessary to develop products in a cooperative manner with a high added value, in interdisciplinary environments and on a global scale, including the handling of advanced design tools, the use of new materials, personalized production, the use of convergent technologies and the incorporation of innovative techniques in industrial management.



This Masters' Degree includes a series of emerging subjects linked to the technologies of industrial design and manufacture, together with the knowledge and skills fundamental in the provision of added value and the profitability of products and industrial processes.



More information

silvia.nuere@upm.es  
(+34) 91 336 32 25

WEB

# Geological Engineering



Teaching Center: School of Mining and Energy Engineering  
Credits: 90  
Languages: Spanish  
Orientation: professional  
Places: 25

The main objective of this Masters' Degree is the training of graduates who will act as an interface between professional in geology and those of engineering in their diverse applications, thus creating potent synergies between the said professional profiles.



The syllabus offers three clearly differentiated options: Management of the physical medium, with emphasis on the interaction between the human being and the geological medium; Research and the Management of Geological Resources, aimed at the search for and responsible use of all types of mineral substances and

industrial rocks; and the Management of Subterranean Space, as a response to the growing demand of developed society for the use of subsoil as another geological resource, with a less aggressive interaction with the environment.



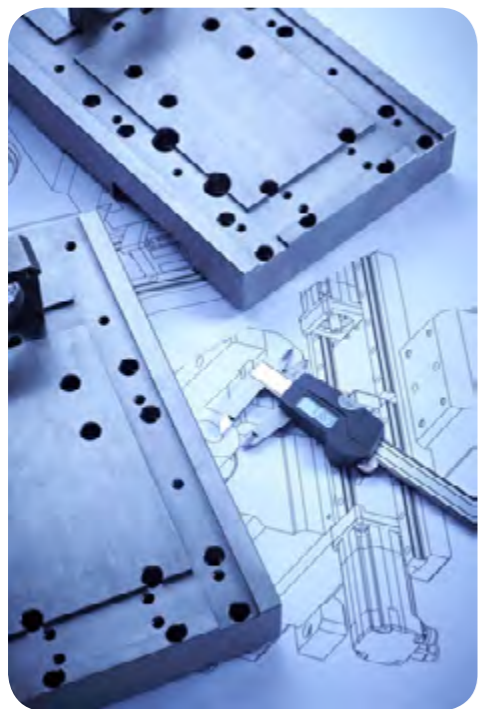
More information

trinidad.torres@upm.es  
(+34) 91 336 6970

WEB



## Mechanical Engineering



Teaching Center: School of Industrial Engineering

Credits: 60 ECTS

Languages: Spanish and English

Orientation: academic, professional and research

Places: 40

The objective of mechanical engineering is the study, analysis, design, manufacture, testing and maintenance of mechanical systems with the aim of developing products and services demanded by the market. This Masters' Degree is oriented in two large areas: one related to the technologies of the development and manufacture of products; and the other related to the technology of vehicles both cars and trains. It offers agreements with universities in Germany, Austria, Belgium, Denmark, France, Czech Republic,

Sweden, Switzerland, China, Japan, USA, Mexico, Chile, Canada, Colombia, Argentina and Brazil. The Masters' Degree influences the development of products, taking as a reference the combined use of computer assisted design tools, calculations and manufacture which, in combination with advanced manufacturing technologies and rapid prototyping, allows the overall development process of products to be optimized, leading to more efficient methodologies and with direct applications in other fields such as Bioengineering.

For their multidisciplinary and multi-purpose training, the graduates in Mechanical Engineering will also have a significant acceptance in the service sector, especially in activities with a high technological content. Among others, it is worth highlighting the maintenance services, transport, the development and commercialization of software, engineering and industrial consulting, insurance or trials

More information

antonio.vizan@upm.es  
(+34) 91 336 30 20

WEB

## Chemical Engineering



Teaching Center: School of Industrial Engineering

Credits: 75

Languages: Spanish and English

Orientation: research and academic

Places: 30

The main objective of the Masters' Degree is the advanced training of students in Chemical Engineering, centered on the development of high level skills, such as the capacity to resolve complex problems, adapting to changing situations, autonomous learning or the generation of new ideas.

The Masters' Degree prepares the students for research, development and technological innovation tasks, with the acquisition of skills such as: the use of scientific and technical bibliographies; the analysis of experimental results; the planning and carrying out of experiments and projects and the use of efficient communications techniques. The transfer of knowledge to the productive sector and society is the training culmination of the syllabus

More information

salvador.leon@upm.es  
(+34) 91 336 31 87

WEB



# Industrial Mathematics



Teaching Center: School of Aeronautics and Space Engineering

Credits: 90 ECTS

Languages: Spanish and English

Orientation: professional and research

Places: 20

The Masters' Degree is organized jointly between the UPM and the *Universities Carlos III de Madrid, Santiago de Compostela, A Coruña and Vigo*. It complies with both the requirements of the European curricular development project and the need for professionals at a European level. The classes take place in the lecture halls with the possibility of following them through videoconferencing. It includes two specializations: Modeling and Numeric Simulation. The Masters' Degree seeks to increase the analytical capacity and knowledge of the students, providing them with the skills for the modeling of engineering systems and the design, construction and use of software specific, at least, to the industrial sector in particular. The training is oriented to the construction of specific solution to specific industrial problems. Likewise, the teachers introduce the students to subjects for research and development related to the subjects that make up the program development.

There is the possibility of obtaining 30 Credits in other European universities and to obtain double degrees at, for example, Oxford, Milan, Dresden, Lund, Tartu and École des Mines de Paris. The work practices are carried out in companies from different sectors, where they will be able to complete their work for their Masters' Degree thesis.

### More information

masterm2i.aeroespacial@upm.es  
(+34) 91 336 63 07 (extensiones 17 y 19)

WEB

# Sustainable Mining



Teaching Center: School of Mining and Energy Engineering

Credits: 60 ECTS

Languages: Spanish and English

Orientation: professional and research

Places: 25

The Masters' Degree addresses different profiles: mining engineers, civil and terrain, geologists or graduates in Earth Sciences. It also offers up to 30 Credits of complementary training for students whose training originated in other technical fields.

The syllabus, which establishes that the course is in English for more than half of the subjects, it is divided into three blocks: mining technologies, environmental management and financial management.

The Masters' Degree has the support of the most significant companies dedicated to exploration and mining exploitation, as well as mining equipment manufacturers and other mining providers.

### More information

eva.salvador.martinez@upm.es  
ja.sanchidrian@upm.es  
(+34) 91 336 69 50 / 70 60

WEB



OFFICIAL MASTERS' DEGREE STUDIES AT THE UPM

# Aerospace Engineering

In accordance with the prestige of the UPM in this area, endorsed by its extensive international cooperation, the quality of its teaching staff, the close links with industry

and the potent means and infrastructures at its disposal, a range of Masters' Degrees is offered which responds to both to the professional structure and demand and the capacities of excellence of the UPM. The range of qualifications includes the Masters' Degree which enables the graduate to carry out the profession of and aeronautical engineer.

OFFICIAL MASTERS' DEGREE STUDIES AT THE UPM

## Aerospace Engineering

DEGREE FOR A SPECIFIC PROFESSION

Aeronautical Engineering

Air Transport Systems

Space Systems



# Aeronautic Engineering



## DEGREE FOR A SPECIFIC PROFESSION

Qualification enabling the graduate to carry out of the regulated profession of an Aeronautical Engineer

Teaching Center: School of Aeronautics and Space Engineering

Credits: 120 ECTS

Languages: Spanish

Orientation: professional

Places: 200

This Masters' Degree trains professionals so that they will be qualified to carry out the regulated profession as an aeronautic engineer. For this reason the students will study 60 Credits from compulsory subjects which will provide the skills necessary for vehicles, propulsion, navigation and airports; 30 Credits from optional subjects grouped into 4 intensifications, and 12 Credits from additional optional subjects, together with 18 Credits corresponding to the work for their Masters' Degree thesis.

All of the teachers participating in this Masters' Degree are experts in their subjects, both from the point of view of research and that of development and innovation. Furthermore, a number of



the teachers are high level technicians and managers in companies in the sector, which confers the student with a real vision of the aerospace industry.

The Technical High School of Aeronautical and Space Engineering, responsible for this Masters' Degree, is the result of the merging of the Technical High School of Aeronautical Engineering and the University School of Technical Aeronautical Engineering. Until a short while ago they were the only Spanish centers which taught aeronautical engineering for nearly 85 years.

### More information

info@aero.upm.es  
(+34) 91 336 62 83

WEB

# Air Transport Systems



Teaching Center: School of Aeronautics and Space Engineering

Credits: 90

Languages: Spanish

Orientation: professional and research

Places: 40

The Masters' Degree is oriented at research activities and professionals in the areas of analysis and architecture in aerospace systems and those of air transit, airline management and the design and exploitation of air transit infrastructures. Its main aim is research applied to the improvement in operational safety, efficiency and the capacity of air transport and its infrastructure, using information technologies and the analysis of systems centered on the human factor.

The teachers have a great deal of experience in teaching, research, development and innovation in the areas of application of the Masters' Degree, with a relationship and participation in the main European R&D programs that are focused on the management of air transit and the air transport system. It is the first official qualification specialized in this area offered by a Spanish university.

### More information

Infra.aeronauticos@upm.es  
(+34) 91 336 63 14

WEB



# Space Systems



Teaching Center: The Ignacio da Riva University Institute of Microgravity (IDR/UPM)

Credits: 120 ECTS

Languages: Spanish

Orientation: professional

Places: 20

**The objective of the Masters' Degree is to provide an advanced training in the area of space engineering systems. From the strictly curricular point of view, the teaching is oriented so that the student acquires the training necessary**

**to understand the scientific and technological methodology that governs the conception and design of a space system: space environment, orbital mechanics, attitude control, thermal control, launchers, space mechanisms and structures, materials, power systems, systems for the management and treatment of data, communications, compatibilities and feasibility, as well as the integration process of the different subsystems in a space system.**



The teaching method is based on Project-based learning which was originally used as the basis for the development of the UPM satellites, as is the real experience derived from the participation of the IDR/UPM as a technological agent in the space missions of the ESA and NASA.

The Masters' Degree is given at facilities of the IDR/UPM, shared between the Moncloa –International Campus of Excellence and the Technical High School of Aeronautical and Space Engineering– and at Montegancedo.

More information

dr@idr.upm.es  
(+34) 91 336 63 53

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# Agro-forestry Engineering and Environment

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From first-class facilities, contrasted training experience and a fluid cooperation with industry, the UPM presents a very wide range of Masters' Degrees in different areas of activity

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which require specialized training needs. There are different areas such as: agro-engineering, genetics, food engineering, rural development, animal production, forest fires, ecosystems or water, all of which make up different aspects of the professional activity in this area. There is an outstanding range of Masters' Degrees which enables the graduate to carry out their profession as an Agricultural Engineer or Forestry Engineer.

## Agro-forestry Engineering and Environment

DEGREE FOR A SPECIFIC PROFESSION

Agricultural Engineering

DEGREE FOR A SPECIFIC PROFESSION

Forestry Engineering

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Agro-engineering

Uses and Management of Water Resources in Natural Environment

Economics Applied to Agriculture, Food and Natural Resources

Environmental Engineering

Environment Research, Modeling and Risk Assessment

Landscaping and Gardening

Animal Production and Health

Ecosystem Restoration

Technology of Forest Fire Fighting

Agro-environmental Technology for a Sustainable Agriculture



# Agricultural Engineering



## DEGREE FOR A SPECIFIC PROFESSION

Qualification enabling the graduate to carry out of the regulated profession of an Agricultural Engineer

Teaching Center: School of Agricultural, Food and Biosystems Engineering

Credits: 120 ECTS

Languages: Spanish

Orientation: professional

Places: 150

The Technical High School of Agricultural Engineers has been giving the academic, scientific and technological training necessary for its graduates to develop their professional activity in agriculture, the rural environment and other related areas since its creation in 1855. The University Masters' Degree in Agronomic Engineering currently maintains the same purpose of giving continuity to its Undergraduate Degree in Agricultural Engineering and Science, in Food Engineering, in Agro-environmental Engineering and in Farming Engineering at the UPM, from which they can access the Masters' Degree directly.

The syllabus offers an integral training, focused on the acquisition of knowledge and skills which enable the graduates to carry out their professional activity as an Agricultural Engineer in the specialties of Crop and Animal Production, Rural Engineering, Agrarian Industries, Agrarian and Agro-environmental Finance.

### More information

secretaria.director.agronomos@upm.es  
(+34) 91 336 56 29

WEB

# Forestry Engineering



## DEGREE FOR A SPECIFIC PROFESSION

Qualification enabling the graduate to carry out of the regulated profession of a Forestry Engineer

Teaching Center: School of Forestry Engineering and Natural Resources

Credits: 120 ECTS

Languages: Spanish and English

Orientation: professional

Places: 50

This Masters' Degree offers advanced training in the forestry and environmental field which allows its graduates to carry out multiple activities in the management of natural resources, the development of renewable energies, the planning of industrial forestry, both in timber and non-timber products, the design and construction of timber infrastructures, territorial planning and natural spaces, and the management and technical assessment of engineering projects. It is a degree of a fundamentally practical nature, for which there are specialized laboratories for the treatment of wood, cellulose, tele-detection, zoology and genetics, among others, as well as fish farming and an arboretum at the Technical High School of Forestry Engineering, and the Natural Environment.

The optional nature of the Masters' Degree (1 semester) allows the student to choose his or her degree of specialization within the fields of forestry management, environmental management and natural resources. Furthermore, double degree agreements are offered with the Czech University of Life Sciences (Faculty of Forestry Sciences and Wood) for the "Forest Engineering" and "Forestry, Water and Landscape Management" program and with the university of Lieja (Gembloux Agro-Bio Tech) for the "Masters' Degree in Bioscience Engineering program: Forest and Nature Management (MBE:FNM).

### More information

subdirector.oa.montes@upm.es  
(+34) 91 336 64 06

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# Agro-engineering



Teaching Center: School of Agricultural, Food and Biosystems Engineering  
 Credits: 60 ECTS  
 Languages: Spanish and English  
 Orientation: professional, research and academic  
 Places: 100

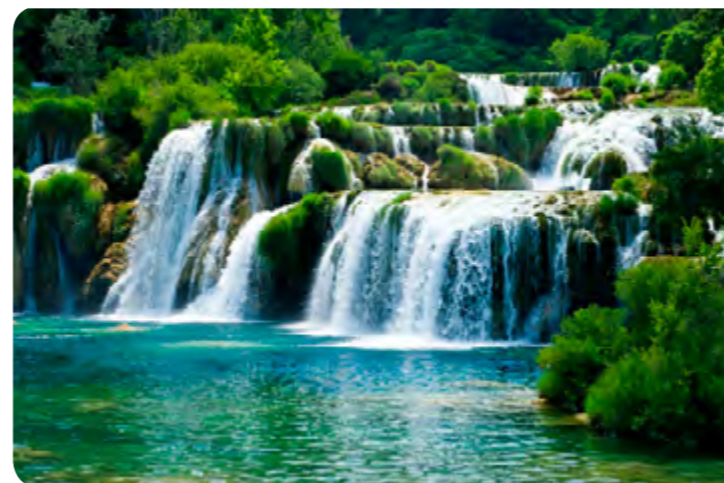
The Masters' Degree is designed to train specialists in one of the different areas of agro-engineering that are offered: rural engineering projects, environmental impact, construction, energy supply, water management, mechanization, or automation and control. The graduate will be qualified for design, project, research, development, innovation, teaching and dissemination to the agricultural, cattle, agro-food and rural, environment in the area of specialization chosen.

### More information

carlos.mejia@upm.es  
 (+34) 91 336 58 52

WEB

# Uses and Management of Water Resources in Natural Environmen



Teaching Center: School of Forestry Engineering and Natural Resources  
 Credits: 60 ECTS  
 Languages: Spanish  
 Orientation: professional  
 Places: 30

The Framework Directive on Water obliges the anthropocentric conception of the management of hydrological resources to be abandoned, that is, only oriented to satisfying the needs of human beings. An environmental and sustainable vision is imposed in which the objective is to reach a good ecological state of masses of water and the associated ecosystems.

Within the framework of this change of paradigm, this Masters' Degree offers concepts and procedures that the new way of managing water ecosystems demand.

Techniques and protocols for the characterization, planning and management of hydraulic resources as well as criteria and methods to deal with the planning and management of uses and cultural services, landscaping

and leisure linked to water ecosystems and which it done with the objective of training professionals capable of providing solutions – knowhow – to the new challenges posed for the management of water in the natural environment. In order to achieve this it offers a balanced training among the scientific bases, the technical tools and work on practical cases, together with work practice in companies and public organizations linked to the management of water.

### More information

tasio.fyuste@upm.es  
 (+34) 91 336 75 31

WEB



## Economics Applied to Agriculture, Food and Natural Resources



Teaching Center: School of Agricultural, Food and Biosystems Engineering  
 Credits: 60 ECTS  
 Languages: Spanish and English  
 Orientation: research and academic  
 Places: 30

The program of this Masters' Degree has the fundamental objective of providing advanced quality training oriented to specialization in the field of the agrarian economy, food and natural resources. It will permit its graduates to enter the work market and develop their careers in agro-food businesses, universities, research centers, consulting companies and national and international organizations in the public sector by applying economic principles and business management.

It is especially designed so that the students that obtain the Masters' Degree qualification will have the skills to integrate the knowledge acquired and tackle the complexity of the subjects in the field of the agrarian economy, food and natural resources, after having developed the tools that allow them to undertake future work or research autonomously. It combines theoretical, practical classes together with individual and cooperative work. It is designed in collaboration with the Centre for Study and Research for the Management of Agrarian and Environmental Risks (Ceigram), linked to provide a multidisciplinary interaction.

### More information

master.ecoagro@upm.es  
 (+34) 91 336 57 96

WEB

## Environmental Engineering



Teaching Center: School of Industrial Engineering  
 Credits: 60 ECTS  
 Languages: Spanish and English  
 Orientation: research  
 Places: 25

Environmental Engineering is the branch of engineering which studies environmental problems in an integrated manner, taking into account its ecological, social, economic and technological dimensions, with the aim of promoting a sustainable and viable development.

The University Masters' Degree in Environmental Engineering, instigated in the 2010-2011 academic year, offers a consolidated program due to its antecedents, since it is designed from the training period of the PhD program in Environmental Sciences given at the UPM since 2004. The admission profile

is very wide due to its multidisciplinary focus, which will allow engineers, graduates and people qualified from other branches of engineering and sciences to access the course. The program includes 13 subjects per semester which vary between 3 and 5 ECTS, as well as a Masters' Degree thesis equivalent to 15 ECTS which must be developed during the second semester.

### More information

manuel.recuero@upm.es  
 ignacio.pavon@upm.es  
 (+34) 91 336 46 96 / 41 53

WEB

## Environment Research, Modeling and Risk Assessment



Teaching Center: School of Mining and Energy Engineering  
 Credits: 60 ECTS  
 Languages: Spanish and English  
 Orientation: professional and research  
 Places: 25

The Masters' Degree is given in English and Spanish. It has been offered in a lecture hall style since the 2006-2007 academic year with a structure divided into six-month periods to facilitate an intensive learning of the subjects. The program endows the students with a specialization specialization with no clear equivalent on the Spanish map of qualifications within the area of the behavior of soil and water contaminants, and very especially, in the analysis of the risks to human health. Furthermore, much attention is paid to contact with industry from the design of the Masters' Degree, with the contribution of up to 12 businesses with interests in the areas of the program.



The students learn to handle the latest generation of analytical and modeling tools and resolve practical cases based on the experience of the teachers, collaborators from industry and invited specialists. They will also obtain the essential skills for the experimental development and interpretation of the results of a PhD Thesis.

### More information

qyc.minas@upm.es  
 (+34) 91 336 69 89 / (+34) 91 336 32 43

WEB

## Landscaping and Gardening



Teaching Center: School of Agricultural, Food and Biosystems Engineering  
 Credits: 90 ECTS  
 Languages: Spanish  
 Orientation: professional  
 Places: 40

The University Masters' Degree in Gardening and Landscaping comes from the transformation of the official Masters' Degree qualification in Gardening and Landscaping, which was given as one of its own courses at the UPM, at the Department of Crop Production: Phytotechnology of the Technical High School of Agricultural Engineering, from 1990 to 2011.



The program is especially oriented to graduates, engineers, people with qualifications and diplomas of an agricultural, agronomical, architectonic, forestry, environmental, landscaping and biological nature. It offers the possibility of carrying out studies comparable to the already existing ones in other foreign universities in the areas of design, projects, planning, implementation, maintenance and management of the landscape, of the environment and gardening work, with the objective of professionalizing and qualifying the graduates to the highest possible level and in such a way that their activity is integrated and developed in businesses and entities on all types of sectors in gardening, landscaping and the environment.

### More information

mjardineria.agronomos@upm.es  
 (+34) 91 452 49 00 ext. 1650

WEB



## Animal Production and Health



Teaching Centers: School of Agricultural, Food and Biosystems Engineering of the UPM and the Faculty of Veterinary Medicine of the UCM

Credits: 60 ECTS

Languages: Spanish

Orientation: professional, research and academic

Places: 40

The general objective of the Masters' Degree is to guarantee an integrated overall training of the university graduates in the activities, the systems and the techniques in the area of animal production and health applied to them. This training could serve as the basis for the later

attainment of a PhD degree of for the incorporation of the graduate into professional activity, in such a way that they know how to tackle the different challenges both efficiently and effectively, both at present or in the future, that arise in the area of the cattle sector.

The joint participation of the Technical High School of Agricultural Engineers at the *Universidad Politécnica de Madrid* and the *Facultad de Veterinaria de la Universidad Complutense*, within the framework of the Moncloa Campus of International Excellence, guarantees the active presence and participation in the teaching part of the Masters' Degree of a wide ranging and prestigious team of teachers. The members of this teaching team, who have a profound knowledge of their subjects, manage or participate in numerous leading research projects on a national and international level, as well as developing collaboration relationships with businesses and institutions that cover the whole range of production and animal health.

### More information

nuria.nicodemus@upm.es  
(+34) 91 452 48 72

WEB

## Ecosystem Restoration



Teaching Center: School of Forestry Engineering and Natural Resources

Credits: 60 ECT

Languages: Spanish and English

Orientation: professional and research

Places: 35

The University Masters' Degree in the Restoration of Ecosystems is a degree from the university of Alcalá (coordinating university), Complutense, Politécnica de Madrid and Rey Juan Carlos, all of them located in Greater Madrid. Teachers from several collaborating institutions and businesses are also participating. The teaching network driving the Masters' Degree is linked to REMEDINAL, a network of research groups in the natural environment of Madrid.

The general objective of the Masters' Degree is the integral training of the student in the field of the restoration of ecosystems. For this reason the student will acquire a sound knowledge of the conceptual bases of the discipline together with existing techniques and their application in case studies.

The program offers simultaneously two orientations, professional and research, the latter is addressed to the carrying out of a PhD Thesis. The syllabus has 60 Credits ECTS, 30 of which come from compulsory subjects and the other 30 from optional subjects. The external work practice could provide 9 or 18 optional ECTS.

### More information

diego.gjalon@upm.es  
(+34) 91 336 63 85

WEB

## Technology of Forest Fire Fighting



Teaching Center: School of Forestry Engineering and Natural Resources  
 Credits: 60 ECTS  
 Languages: Spanish and English  
 Orientation: professional  
 Places: 25

The Masters' Degree aims to cover the growing demand for professionals specialized in combating forest fires. Able to carry out multiple related activities, such as the development of prevention strategies and the management of fires, ways of restoring the affected areas, evaluation of the ecological, social, and economic consequences, application of Information and Communications Technologies, studying the carbon footprint, the management of human resources in the areas of health and safety, and the development public participation systems in the fight against forest fires. It combines 'online' learning with work practice in businesses from the sector, the Public Administration or research centers.



The graduates of this Masters' Degree will be able to access technical and management positions in businesses related to the prevention of forest fires and the management of resources to extinguish them; also in organizations responsible for studying their causes, damage evaluation and the corresponding insurance, as well as the restoration of the burned territory. This Masters' Degree is the result of the European "MSc Technology-enhanced Forest Fire Fighting Learning" (MATEFL) project, financed by the European Lifelong Learning Program.

More information

subdirector.oa.montes@upm.es  
 (+34) 91 336 64 06

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## Agro-Environmental Technology for a Sustainable Agriculture



Teaching Center: School of Agricultural, Food and Biosystems Engineering  
 Credits: 60 ECTS  
 Languages: Spanish and English  
 Orientation: professional and research  
 Places: 30

The Masters' Degree responds to an academic, scientific and professional demand for postgraduate training in productive and environmental aspects in an agrarian environment. For this reason, a series of theoretical-practical courses that cover the most up-to-date aspects of diverse disciplines in area of knowledge related to areas of crop production, agro-environmental technology and the agrarian economy and natural resources.



The graduates will be able to continue their training as researchers within the PhD program linked to the Masters' Degree or enter the professional world as a specialist in agro-environmental technologies for sustainable agriculture. The demand for postgraduates and PhD graduates specialized in these areas is growing areas, both in universities and research centers as technologists and businesses.

More information

master.tapas.agronomos@upm.es  
 (+34) 91 336 57 75

**WEB**



# Civil Engineering

The UPM presents, within the area of Civil Engineering, a varied and rigorous range of Masters' Degrees of a great professional and scientific scope. As well as the value of its teachers, the quality of its facilities and

infrastructures, the connection with the business sector and the wide ranging experience is added as value to these qualifications which is partly taught in English. Among the included Masters' Degrees, it is highlighted that the graduate is qualified to carry out his or her profession as a civil engineer.

## Civil Engineering

### DEGREE FOR A SPECIFIC PROFESSION

Engineering of Roads, Canals and Ports

Structural Engineering and Materials

Seismic Engineering: Soil and Structural Dynamics

Infrastructure Planning and Management

Civil Engineering Systems





# Engineering of Roads, Canals and Ports



The Masters' Degree awards the professional qualification of a Civil Engineer in Spain, which allows him or her to plan all kinds of public works and manage their construction, as well as planning and managing services and resources for the urban and rural environment and territorial planning. It is oriented to training multi-faceted professionals with a sound training sustained in the scientific method, generalist technical preparation and with the capacity for autonomous learning. This means that civil engineers have always enjoyed a great acceptance in the work market, even outside of the area of public works.

Of the 120 ECTS of the Masters' Degree, there are 81 ECTS from compulsory subjects, which guarantee an advanced generalist training. The specialization offers the possibility

## DEGREE FOR A SPECIFIC PROFESSION

Qualification enabling the graduate to carry out of the regulated profession of a Engineer of Roads, Canals and Ports

Teaching Center: ETSI Caminos, Canales y Puertos

Credits: 120 ECTS

Languages: Spanish

Orientation: academic and professional

Places: 150

- of choosing from a range of 54
- optional subjects grouped together
- in four specializations: "Structures, Geo-technology, Construction and Materials", "Hydraulics, Energy and the Environment", "Transport, Territory and Urbanism" and "Financing and Project Management and Infrastructures".
- The professional experience of the team of teachers contributes to close links between the learning and a profession in which Spanish companies are currently undoubtedly leaders in the world.
- The Masters' Degree also provides access to the third cycle in Higher Education, that is, the PhD Degree.

### More information

jefe.estudios.caminos@upm.es  
 (+34) 91 336 67 27 (+34) 91 336 64 31

WEB

# Structural Engineering and Materials



Teaching Center: ETSI Caminos, Canales y Puertos

Credits: 60 ECTS

Languages: Spanish and English

Orientation: professional and research

Places: 50

The aim of the Masters' Degree is to train university graduates of the second cycle in the area of structures, geo-technology and structural materials, with an advanced professional preparation, with a high academic level and a sound initiation into R&D&I activities.



The Masters' Degree, which has been given since the 2006-2007 academic year, offers a technological itinerary and a research one. Its 60 Credits are divided into a module of academic training, a module of initiation into R&D&I, a module of itinerary and a Masters' Degree thesis, of 12, 18, 18 and 12 Credits, respectively. All of the subjects of the training, academic and initiation into R&D&I modules are compulsory, whilst those of the itinerary module are optional.

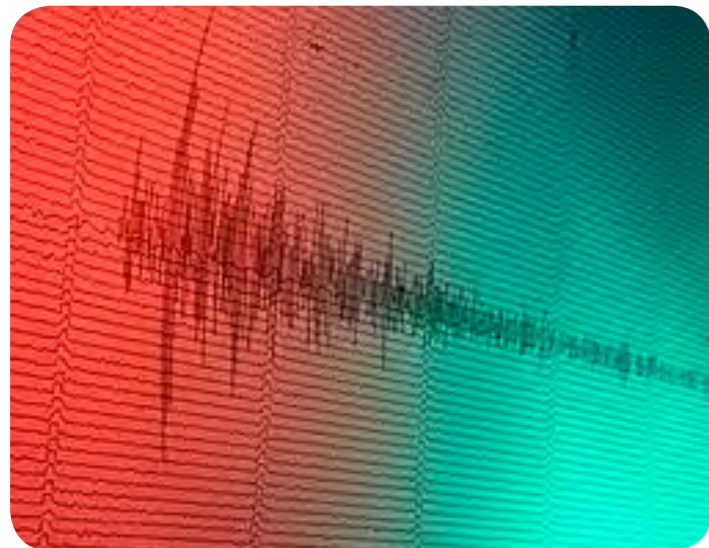
### More information

vicente.sanchez@upm.es  
 (+34) 91 336 67 40

WEB



## Seismic Engineering: Soil and Structural Dynamics



Teaching Center: School of Industrial Engineering

Credits: 60

Languages: Spanish and/or English

Orientation: research

Places: 30

**The high degree of damage caused by recent earthquakes in supposedly earthquake-proof constructions (Northridge, 1994; Kobe, 1995; Turkey,**

**1999, L'Aquila, 2009; Lorca, 2011) highlights the need to increase our knowledge of these phenomena and en in the project of structures with a suitable response. Along these lines, the objective of the Masters' Degree is to train researchers and professionals in the areas of seismic engineering and the dynamic behavior of soils and structures, which may later be incorporated into research teams and/or company R&D departments. The students acquire skills to be able to draw up and lead projects, or plan strengthening systems for the active or passive dissipation of energy.**



Some Masters' Degrees at Spanish universities include seismic engineering as a specialization or intensification content, but it is the University Masters' Degree in Seismic Engineering: Dynamics of Soils and Structures at the UPM which is the only one centered on this discipline. Furthermore, it collaborates with several research centers and international universities such as the ELSA Laboratory, the Federico II University, The University of Patras, The University of Lovaina, The University of Porto and *École Centrale de Nantes*.

### More information

master\_ing\_sismica@etsii.upm.es  
enrique.alarcon@upm.es  
(+34) 91 336 30 21

WEB

## Infrastructure Planning and Management



Teaching Center: School of Civil Engineering

Credits: 60 ECTS

Languages: Spanish

Orientation: professional

Places: 60



The Masters' Degree provides an advanced training in the efficient management and planning of all types of infrastructures related to Civil Engineering. It undertakes the acquisition of management and planning knowledge related to the entire lifecycle of an infrastructure, from the design to the construction, continuing with its maintenance and refurbishment, and ending with its demolition or disassembly, all of this within a framework of sustainability an respect to the environment. The graduates will be able to innovate and apply the latest trends and tools in the area of infrastructures, creating differentiating advantages to improve

the profitability and competitiveness of the businesses that carry out the activity.

The Masters' Degree has the support of the Spanish leading companies and institutions, demanding and offering infrastructure planning and management services: D.G. Infraestructuras del Ayuntamiento de Madrid (Infraestructures of the Madrid City Council), D.G. de Ferrocarriles (railways) and D.G. of Highways at the Ministry of Public Works, Guilds Federation, Accesos de Madrid, Transport and Infraestructures de la CAM, Canal de Isabel II, Vías and Construcciones (Tracks and Constructions), Incope Consultores, Arespa, Retineo, Aliner, CNC, Cointer, Seopan, TYPESA, INYPSA, Eyser, etc.

### More information

david.fernandez-ordonez@upm.es  
marian.quijano@upm.es  
(+34) 91 336 77 36

WEB

## Civil Engineering Systems



Teaching Center: ETSI Caminos,  
Canales y Puertos  
Credits: 60 ECTS  
Languages: Spanish and English  
Orientation: professional and research  
Places: 50

The aim of the Masters' Degree is to train university graduates in the second year in the areas of civil engineering infrastructures, understood as interactive systems in territorial planning. It offers an advanced professional itinerary together with one in research. In each one, there is the specialization in Transport and Territory, and Hydraulics, Energy and the Environment. The training objectives of each itinerary are, respectively, the skills necessary for the management of teams and R&D&I activities in planning, design, construction and exploitation of hydraulic or transport infrastructures, as well as in the analysis of its territorial and environmental effects.

The 60 Credits of the Masters' Degree are divided into 40 Credits in subjects in common thematic areas (2 compulsory subjects, 9 Credits) and specialization (2 compulsory, 9 Credits and the rest, 22 Credits, of choice), seminars (5 Credits) and Masters' Degree thesis of 15 Credits, respectively.

More information

javier.sanfelipe@upm.es  
(+34) 91 336 52 57

WEB





# Naval Engineering

The UPM has an extensive engineering register qualified for maritime activity and naval construction. The long tradition in the training of professionals in this area, together with a wide ranging academic, scientific and industrial cooperation prestige, allows the UPM to offer the Masters' Degree which qualifies the graduate to carry out the profession as a naval engineer.



## Naval and Oceanic Engineering

### DEGREE FOR A SPECIFIC PROFESSION

Qualification enabling the graduate to carry out of the regulated profession of a Naval and Oceanic Engineer



Teaching Center: School of Naval Architecture and Marine Engineering

Credits: 120 ECTS

Languages: Spanish

Orientation: professional

Places: 60

The general objective of this Masters' Degree, which is only given in Spain at the UPM, is to train professionals with an interdisciplinary capacity to conceive and plan suitable technical, economic and environmental solutions to the needs of maritime transport, both freight and passenger, defense and maritime safety and the exploitation of oceanic resources (fishing, energy and recreation).

The skills acquired by the students at the end of their Masters' Degree studies are:

- The capacity to plan shipping suitable for the needs of maritime transport.
- Advanced hydrodynamic naval knowledge, as well as shipping dynamics and naval structures and their applications in the optimization fairings and propellers.
- The capacity to analyze alternative solutions for the definition and optimization energy plants and ship propulsion.
- Knowledge about everything related to the shipping and construction and exploitation of shipping in its different facets.
- The capacity to plan ocean platforms and artifacts, as well as fishing boats and everything related to maritime food sources and its exploitation.

More information

fernando.robledo@upm.es  
(+34) 91 336 71 44

WEB



# Information and Communications Technologies

The excellence of the UPM in this area is reflected in a range of Masters' Degrees attractive, diverse, of a marked professional character, with a high scientific and academic

quality and in magnificent facilities on several Campuses of the University. The range encompasses specialized content which covers a wide spectrum of new professional demands, including, among others, aspects such as telematics, software engineering, distributed systems, systems and services or artificial intelligence. Many of the qualifications figure on the list of the Masters' Degrees of the best quality and prestige offered in Spain. In this diversified range the Masters' Degree is highlighted as it qualifies the graduate to carry out his or her profession as a Telecommunications Engineer. Furthermore, the Masters' Degree complies with the requisites of the Ministry of Education, Culture and Sport for a Computer Engineer.

## Information and Communications Technologies

### DEGREE FOR A SPECIFIC PROFESSION

Telecommunications Engineering

Computer Science and Computing Technology

Telematic Services and Network Engineering

Electronics Systems Engineering

Systems and Services Engineering for the Information Society

Software Engineering

Geodesy Engineering and Cartography

Informatics Engineering

Web Engineering

Artificial Intelligence

Distributed and Embedded Systems Software

Software and Systems



# Telecommunications Engineering



## DEGREE FOR A SPECIFIC PROFESSION

Qualification enabling the graduate to carry out of the regulated profession of a Telecommunications Engineer

Teaching Center: School of Telecommunications Engineering

Credits: 120 ECTS

Languages: Spanish

Orientation: professional, research and academic

Places: 90

This Masters' Degree qualifies the graduate to carry out his or her profession as a Telecommunications Engineer, by means of an academic qualification accredited by the ABET agency. Its objective is to train professionals for a sector, that of information and communication technologies, characterized by its dynamism, globalization and economic and social importance, where the demand for Telecommunications Engineers at the UPM is very high. For this reason it starts with the experience of having trained more than 14,000 engineers, offering a Masters' Degree guided by academic excellence, internationalization and integration into the productive tissue.

The program establishes a common first course oriented to design, integration and the management of systems, and another of specialization in areas of relevance to the sector, in which work practice can be carried out in more than 300 companies with which there is a cooperation agreement. The internationalization is undertaken mainly by means of double degree and mobility agreements (Erasmus program) with foreign universities of renowned prestige.

### More information

info\_muit@etsit.upm.es  
(+34) 91 336 72 44

WEB

# Computer Science and Computing Technology



Teaching Center: School of Computer Systems Engineering

Credits: 60 ECTS Languages: Spanish and English

Orientation: research

Places: 50

The main objective of the Masters' Degree is to train highly qualified professionals for research and innovation in the area of Computer Engineering, more specifically Computer Sciences and Technologies. The function of the chosen itinerary, the degree admits the following specialization: Computer Sciences, Innovation in Software Engineering and Intelligent Systems for Communication.

The graduate will be able to lead research and innovation projects and actively participate in technological development. They will be able to join companies in the information and communications sector or go on to PhD studies. In the latter case, they have direct access to any PhD program in the field of computer engineering, although they will also be able to access PhD programs in other branches of Architecture and Engineering, complementing their training in aspects that the admission requirements for the program demand.

### More information

crongas@eui.upm.es  
(+34) 91 336 54 83

WEB

# Telematic Services and Network Engineering



Teaching Center: School of Telecommunications Engineering

Credits: 60 ECTS

Languages: Spanish

Orientation: professional and research

Places: 20

The general objective of the Masters' Degree is to provide the students with an advanced training in communications and engineering networks of telematic services, which includes technical aspects as well as management, economics, technological regulations and innovation. The program, which pays special attention to research, enables the student to analyze the contributions, the problems and the limitations of current systems, as well as generating new knowledge. It also involves the development of new applications for already available knowledge

to facilitate the improvement and innovation of networks and telematic services. Another skill that the graduate acquires is the capacity to transmit this knowledge both to people from the business sector and undergraduate and postgraduate students.

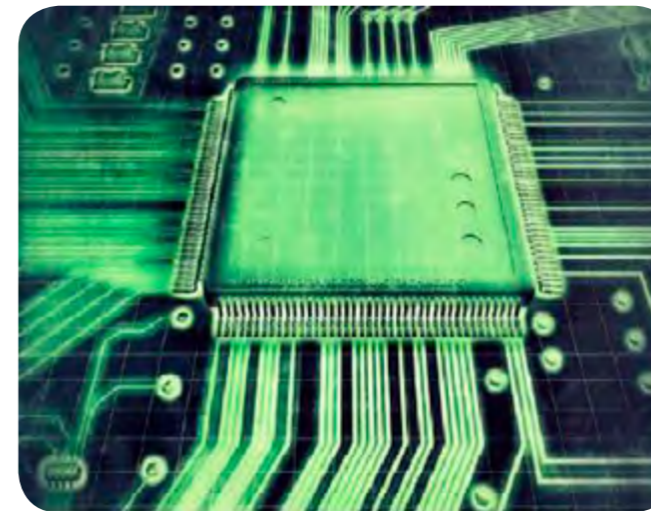
The ultimate aim of the Masters' Degree is to give the students an advanced training, specialized and multidisciplinary, oriented to promoting his or her initiation into research tasks which allows them to contribute, in the areas in which they are going to carry out their task, to the scientific, technical, social and economic progress in the area of network engineering and telematic services.

More information

muirst@dit.upm.es  
(+34) 91 549 57 00 - extensión 3014

WEB

# Electronics Systems Engineering



Teaching Center: School of Telecommunications Engineering

Credits: 60 ECTS

Languages: Spanish and English, in accordance with the needs of the students

Orientation: professional and research

Places: 60

The Masters' Degree is addressed to students and professionals in any technical or scientific area that requires or uses electronics as the basis for their development or activity (automotion, instrumentation, control, bioengineering, biomedical systems, energy), as well as information and communications technologies (consumer electronics, terminals), which are the basis and fundament. Distinguished by the financial newspaper 'Expansión' as the best Masters' Degree in Electronic Engineering in 2013, many of the leading companies of the sector participate in its design and teaching, in which the students are able to carry out work practice and study for a Masters' Degree thesis.

The Masters' Degree prepares the future graduates to conceive and design circuits or electronic systems, as well as their possible applications, with a multifunctional and interdisciplinary training. The teaching method, based on the development and implementation complete functional projects, challenges the students with real problems, which strengthens their knowledge and innovation skills, as well as market analysis, communications and team work together with the development of the creative capacity and long term learning.

More information

ruben.sansegundo@upm.es  
(+34) 91 549 57 00 - extensión 4228

WEB



# Systems and Services Engineering for the Information Society



Teaching Center: School of Telecommunications and Systems Engineering

Credits: 60 ECTS

Languages: Spanish and English

Orientation: professional and research

Places: 40

The objective of the Masters' Degree, aimed especially at graduates, engineers, technical engineers and people with qualifications and diplomas in the area of Information and Communications Technologies (ICT), is to provide the students with advanced knowledge in Telecommunications and a high level of professional specialization, as well as

research training to access later PhD studies. The program has a double degree agreement for the Masters' Degree with the University of Mannheim (Germany), together with student mobility agreements with universities of renowned prestige in, USA and China.

The Masters' Degree offers a good compromise between compulsory and optional subjects in such a way that the student is able to acquire skills in those areas of Telecommunications that are of their interest: Audiovisual Systems, Electronic Systems, Telecommunications and Telematic Systems. The learning qualifies the students to plan design and develop systems and services within the framework of ICT, by stimulating the capacity for innovation and entrepreneurship of the students and with criteria for accessibility and sustainability, all of which in a wider context for the Information and Knowledge Society.

More information

sid@etsist.upm.es  
(+34) 91 336 77 76

WEB

# Software Engineering



Teaching Center: School of Computer Engineering

Credits: 120

Languages: English

Orientation: professional

Places: 30

The objective of this Masters' Degree is to train software engineers, offering a syllabus which is developed primarily in English, in a multicultural environment which prepares then to respond to the current necessities of this industry in a global environment. The applied nature of the teaching is highlighted as is the program for work practice in leading companies of the sector, such as IBM, Everis, NCR, Atos Origin and Accenture, among others.

The academic content was designed in 2007 together with three leading European universities, establishing a joint program whose high quality was recognized by the European Union by means of the Erasmus Mundus Brand Name (EMBN). Thanks to the participation in this consortia, together with other agreements with relevant

- universities at a world level – Free University of Bozen- Bolzano (Italy), Technische Universität Kaiserslautern (Germany), University of Oulu (Finland), BeiHang University (China), Illinois Institute of Technology (USA)–, the students of the Masters' Degree have the possibility of studying for two years at different centers and obtain a double degree, with an offer of specific mobility grants for students of this joint program.

More information

master.emse@fi.upm.es  
(+34) 91 336 69 17

WEB

## Geodesy Engineering and Cartography



Teaching Center: School of Land Surveying, Geodesy and Mapping Engineering

Credits: 90 ECTS

Languages: Spanish and English (some subjects)

Orientation: professional and research

Places: 50

This Masters' Degree is the heir to the old second-year qualification called Engineer in Geodesy and Cartography. Its objective is to train engineers expert in technologies related to the acquisition and efficient management of geographical information, which have been experiencing enormous expansion in recent years both in the world of engineering and different everyday aspects related to the life of the people.

The Masters' Degree program presents itineraries specialized in the capture and integration of geographical information on the one hand, and the management of this geo-spatial information, on the other. In both

cases, the student can choose between a professional or research orientation. The second one leads directly to the research phase of the PhD program in Engineering Geomatics which are offered jointly by the *Universidades Politécnicas de Madrid and Valencia*.

### More information

subdirector.doctorado.topografia@upm.es  
(+34) 91 336 79 30 / 58 87

WEB

## Informatics Engineering



Teaching Center: School of Computer Engineering

Credits: 120

Languages: Spanish and English

Orientation: professional

Places: 80

The Masters' Degree in Computer Engineering develops and deepens the training related to leadership and project management, as well as complementing the specific technology associated to different professional profiles in the area of Information and Communications Technologies. The student profile for this Masters' Degree is professional one with a wide ranging scientific, technological and socioeconomic training, prepared to lead and manage development projects and application in the area of computing. It also opens doors to the students who wish to obtain different certifications highly valued in the work market.

The Masters' Degree has mobility agreements with different foreign centers. Especially significant is the agreement with the Illinois Institute of Technology (USA). From the 2015-2016 academic year, it will form part of the EIT ICT Labs Master School initiative, which offers the student a pioneering training in innovation, with the possibility of obtaining a double diploma in centers as prestigious as KTH or TU-Berlin and the seal of Innovation of ICT Labs.

### More information

master.ii@fi.upm.es  
(+34) 91 336 52 82 / 37 42

WEB



## Web Engineering



Teaching Center: School of  
Computer Systems Engineering  
Engineering

Credits: 60 ECTS

Languages: Spanish

Orientation: professional

Places: 60

This Masters' Degree endows the engineering student with an advanced and specialized training to be incorporated into the different professional profiles for the development of web applications. The range of professional positions for which the graduates are qualified is very wide, the following are highlighted: computer web applications analyst, web development engineer, head of computer web projects, consultant and auditor in Web solutions. It is an eminently practical Masters' Degree, in which every student will be continually able to experience the concepts and technologies which mark the current trends of the professional market.

- The skills that the students acquire, all of which are in current professional environments, will allow them to set out, analyze and design in a web development with the suitable methodologies. Furthermore, they will be qualified to program, test, deploy and maintain a web development on existing platforms and architectures. The Masters' Degree also prepares the student to configure tools and environments for web development, integrate libraries, protocols and standards, incorporate security, quality, usability and persistence of development web. Finally, they are qualified to organize, coordinate and supervise a web development team.

### More information

miw@etsisi.upm.es  
(+34) 91 336 54 88

WEB

## Artificial Intelligence



Teaching Center: School of  
Computer Engineering

Credits: 60 Credits ECTS

Languages: English and  
Spanish

Orientation: research

Places: 45

The general objective of the Masters' Degree is to prepare the student for innovation in the area of artificial intelligence in two senses: the creation of innovative techniques and methods in the area of research into artificial intelligence and the incorporation of these procedures into social and business reality, creating innovative computer processes and solutions. It is addressed to two student profiles: that interested in specialization in one or several specific disciplines in artificial intelligence, which he or she will have to study only the subjects and seminars of certain subjects; and the student that is looking for a more global vision in order to obtain general knowledge on the different subjects that make up the Masters' Degree, who will have the option of taking subjects in all of them.

The Masters' Degree, which constitutes the training period for the PhD degree in Artificial intelligence, has, in the last 4 years, has occupied one of the three positions in the ranking of 250 Masters' Degrees and a complete MBA guide drawn up by the 'El Mundo' newspaper. There are mobility grants provided by the Ministry of Education, Culture and Sport.

### More information

masteria.dia@fi.upm.es  
(+34) 91 336 74 47 / 74 33

WEB

## Software and Systems



Teaching Center: School of Computer Engineering

Credits: 60 ECTS

Languages: Spanish and English

Orientation: research

Places: 40

The Masters' Degree undertakes a panorama of the paradigms on which the software product and its development process is based. It covers key aspects in Software Engineering for which satisfactory solutions are sought (verification and validation of software, new methodologies). It is orientated to the different technologies involved in the development of software, offering an in depth study and particularization in different aspects related to current research in software and systems. National and international experts give up-to-date seminars in the latest trends and have the direct collaboration of the IMDEA Software Institute.

This Masters' Degree is mainly oriented to computer engineers interested in orienting their career to research (culminating in obtaining a PhD Degree) or on completing their training with specialized studies in subjects at the vanguard with a research nature. It arises as a piece necessary within the current context of the training of qualified researchers, the final aim being the specialization in research techniques in computing, dealing with those lines of research in which the teachers make up national and international references, with research groups, projects financed by competitive calls, publications and PhD Theses.

More information

master.muss@fi.upm.es  
(+34) 91 336 73 93

WEB

## Distributed and Embedded Systems Software



Teaching Center: School of Computer Systems Engineering

Credits: 90

Languages: Spanish

Orientation: professional

Places: 30

Nowadays, practically any computer system is made up of multiple computers interconnected through communications networks. This type of system is known as a distributed system and the current and future trend is towards ubiquity; that is, the computers are installed (and embedded) in any place in human life (home, transport, work, city, hospital, commerce). These computers offer ubiquitous accessible services accessible at all times normally by wireless networks and can be accessed through different devices (smart phones, smartcards, tablets).

The students who take this Masters' Degree will acquire knowledge and skills which will allow them to undertake multidisciplinary projects successfully in different areas of computer engineering. Typical projects include: smart buildings (Domotics), cloud services, network service security, smart grids, smart cities', the development of applications of devices for personal and robotic access. Among others, the students will acquire the following skills: programming smart phones, network security administration of cable and wireless networks, design and development of distributed systems tolerant to failure, and programming control systems in real time.

More information

jnaranjo@eui.upm.es crongas@eui.upm.es  
(+34) 91 336 54 83

WEB



# The experience of the students



**Rodrigo Castañeda**  
*University Masters' Degree in Technology for Human Development and Development*  
Head of the Associations Unit at the FAO

“The Masters' degree at the UPM was essential in finding a clearer direction in my professional career. I connected with the fundamental areas of cooperation for development and the reference institutions, in my case the Organization of the United Nations for Food and

Agriculture (FAO). Furthermore, I got the opportunity to meet key people who have influenced my training, even those who supported me in the process of reinsertion into the workplace”.



**Pablo Serrano**  
*University Masters' Degree in Electro-mechanical Engineering*  
Engineer in the European Organization for Nuclear Research (CERN)

“I consider that what they teach me in the lecture rooms and laboratories is essential (knowledge, techniques, methods, languages, software) as it is really used in industry. In the case of the UPM, this university-industry connection is real and direct, and the Masters' Degrees are perfectly focused on the specific needs of the industrial sector. Furthermore, the teachers at the university are renowned internationally which is of great help for later insertion into the work market”.



**Lidia Pérez Plaza**  
*University Masters' Degree in The Management of Organizations and Sports Facilities*  
Founding partner of the Fitness 19 chain of gymnasiums

“Both the external work practice and the group dynamics or the working assumptions that are made during the study load are a practice for real life. Every exercise for each of the Masters' Degree, the entire dynamic with my colleagues, as well as the drawing up of a final business plan, makes you research, consult and get to know different ways at the moment of taking advantage of your knowledge in your present or future work”.



**Xun Zhang**  
*University Masters' degree in Advances Architectonic Projects*  
Architect

The Masters' Degree has been very important for me. I think that the teaching of architecture in China, although it is gradually improving, does not pay much attention to either history or theory, is concentrates on the practical aspect. However, it may be necessary since the growth in construction in my country is very rapid. In the UPM I studied a lot of theory, history, urbanization which has helped me think more.



**Inmaculada Martínez Garrido**  
*University Masters' Degree in Systems and Services for the Information Society*  
PhD student with a Picata grant from the CEI Moncloa

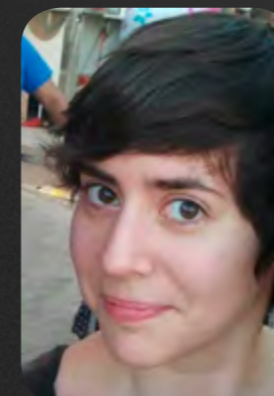
“The Masters' Degree is an essential tool for the professional future, both if you want to keep growing in your scientific studies or in the business sector, as well as being a training which makes all the difference when competing with professional graduates who have not take postgraduate studies, since it allows you to go deeper into specific and novel aspects of engineering.



**Milan Rashevski**  
*University Masters' Degree in Construction and Atchotectonic Tecnology (2012)*  
Architect and Energy Consultant

“The Masters' Degree helped me to become more competitive when up against other architect colleagues, for example, at the time of carrying out high-level energy simulations.

It offered me a wide-ranging vision of the technologies that I did not study at the university at which I did my undergraduate studies. It was also a great basis for the carrying out of my PhD thesis as I learnt important tools for research, processing and analyzing data and drawing conclusions



**Clara Matutano Molina**  
*University Masters' Degree in Civil Engineering Systems*  
Research in the Technological R&D&I Center of Acciona Infrastructures, within the Marítimas work group

“I mainly recommend the UPM to study for the Masters' Degree because from my point of view it is one of the best universities to take technical university studies”.



# Did you know?

**Did you know that the UPM has two International Campuses of Excellence?**

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**Did you know that the UPM has the largest five-sided virtual reality caves in Southern Europe?**

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**Did you know that the UPM has the oldest seed bank in Spain?**

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**Did you know that the UPM has one of the seven Control Centers for the operation of experiments on the International Space Station in Europe?**

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**Did you know that researchers at the UPM have developed microrobots that imitate biological beings?**

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**Did you know that the UPM has 18 Research centers that complement and strengthen its teaching?**

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**Did you know that the UPM has supported the creation of 144 technology-based companies?**

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**Did you know that the UPM cooperates in different areas with more than 7,000 businesses?**

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**Did you know that the UPM already holds 440 patents?**

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**Did you know that every year the UPM offers more than 3,000 work practices in companies and 500 offers of work?**

**Did you know that the UPM promotes a specific program to support disabled students?**

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**Did you know that the UPM leads the medals table in sports competitions in Madrid?**

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**Did you know that the UPM has 124 Educational Innovation Groups in which 1,000 teachers participate?**

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**Did you know that the UPM is the leader in Cooperation for Development?**

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**Did you know that the UPM offers a privileged environment in its 17 libraries?**

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**Did you know that the UPM has an Equal Opportunities Unit?**

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**Did you know that the UPM has 1,570 international agreements with universities?**

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**Did you know that the UPM is the leading Spanish university for the obtaining of external resources from the competitive regime of the EU?**

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**Did you know that the UPM has more than 80 university-business chairs?**

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**Did you know that the UPM is the Spanish university with the greatest number of graduates in management positions in large multinationals?**

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**Did you know that the UPM has the largest computerized greenhouse for research in Spain?**





UNIVERSIDAD POLITÉCNICA DE MADRID

# Engineering the future

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