



POLITÉCNICA

"Ingeniamos el futuro"

CAMPUS
DE EXCELENCIA
INTERNACIONAL

Universidad Politécnica de Madrid
E.T.S. de Ingenieros de Caminos,
Canales y Puertos



Technical University of Madrid

Universidad Politécnica de Madrid (UPM)

School of Civil Engineering

Escuela de Ingenieros de Caminos, Canales y Puertos

Dr.-Ing. Carlos Zanuy, Assist. Prof.
International Coordinator
December, 2014



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Studying and living in Madrid, Spain

Capital of Spain.

Population: 3.5 million (5 million metropolitan area).

Political, economical and cultural center.

Museums, exhibitions, sports, leisure.

7 public universities.

Modern infrastructures, easy connections.

Open and international city: nobody feels as a foreigner.





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This is Madrid

Continental-mediterranean climate,
average temperature 15°C (6°C in winter
and 25°C in summer), average humidity
55%, 2,800 daylight hours/year



Royal Palace and city center
seen from West Park (near
UPM)



Retiro Park





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This is Madrid



Plaza Mayor, Main Square



Prado Museum



*Santiago Bernabéu
Stadium*

Museums
Theaters
Parks
Restaurants



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This is Madrid



Las Ventas Bullfighting Arena



Preciados
Street by
night

Royal Theater



Leisure, fun and
nightlife

Tasca or
tapas bar





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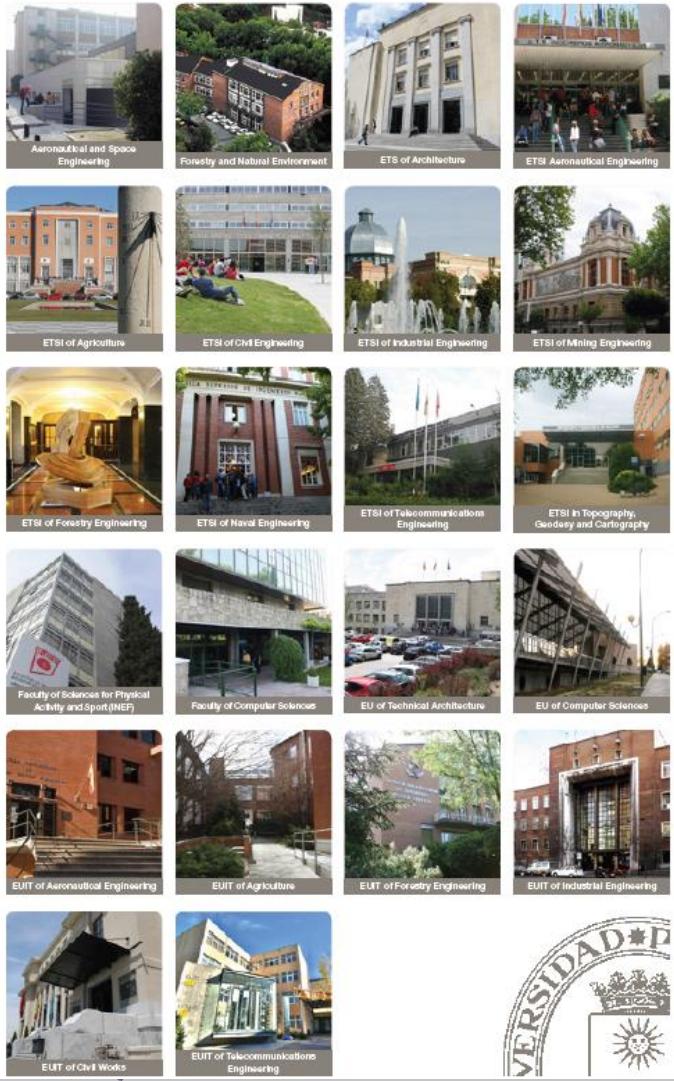
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UPM: the Technical University of Madrid

22 schools in 4 campus.
40,000 students (2,000 international).
3,300 teaching staff.
Annual budget of 330 million EUR.

40 undergraduate programmes.
60 master programmes.
30 PhD programmes.



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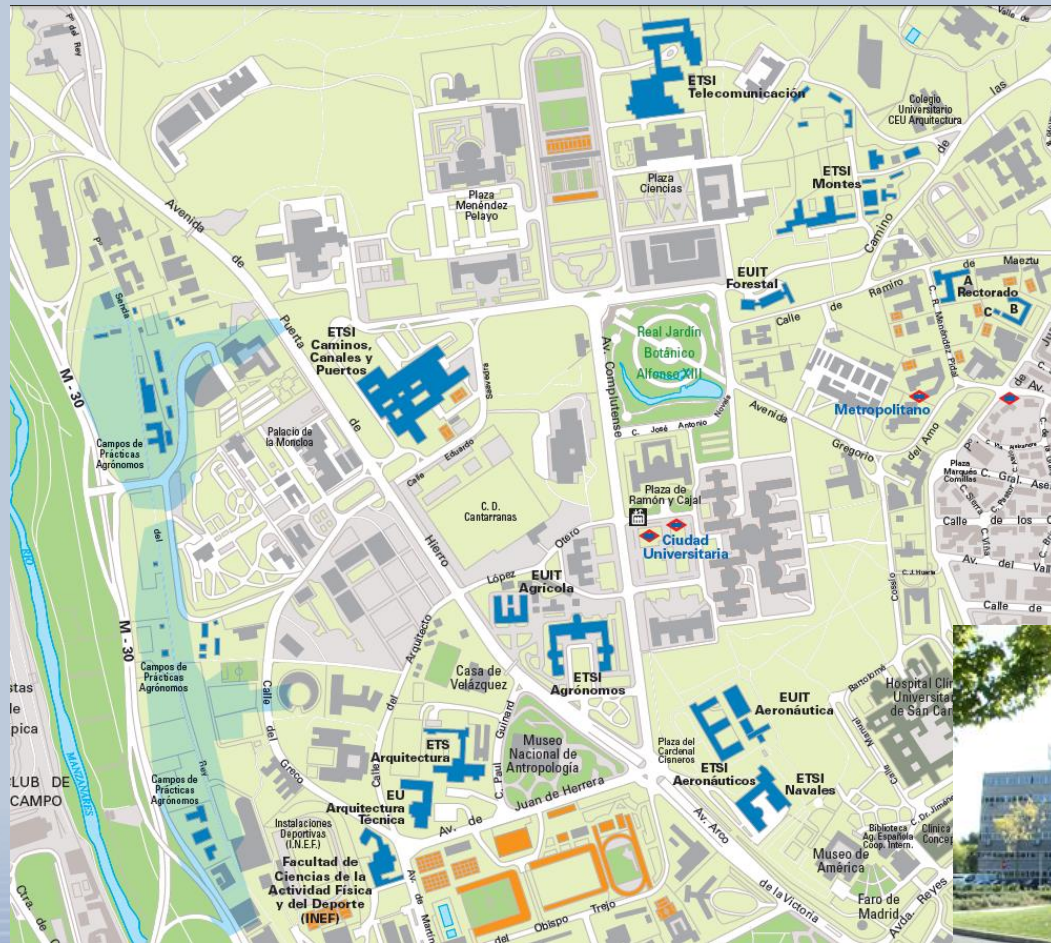
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Escuela de Ingenieros de Caminos, Canales y Puertos Civil Engineering & Materials Engineering

Campus Moncloa (4 km²).
2,500 students
(200 international).
250 teaching and research staff.

2 Bachelor programmes.
4 Master programmes.
2 PhD programmes.
All areas of civil and materials engineering



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Escuela de Ingenieros de Caminos, Canales y Puertos Civil Engineering & Materials Engineering

The School is on *Ciudad Universitaria*, a west-central green district of over 4 km².



The *Campus Moncloa* is shared by UPM and Complutense University: 100,000 students.



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A brief historical introduction

Over 200 years of history

1785: Count of Floridablanca, Secretary of State, creates the General Road Administration.

1799: Foundation, General Inspection of Roads and Channels. Agustín de Betancourt.

1802: Foundation of the School. *Escuela de Ingenieros de Caminos, Canales y Puertos.*

1837: First Spanish railway La Habana-Bejual (Cuba).

1848: First mainland railway Barcelona-Mataró.

1851: Railway Madrid-Aranjuez.

1858: Opening *Canal de Isabel II*, hydraulic infrastructures and dams.

1915: Pyrenees Tunnel at Canfranc.

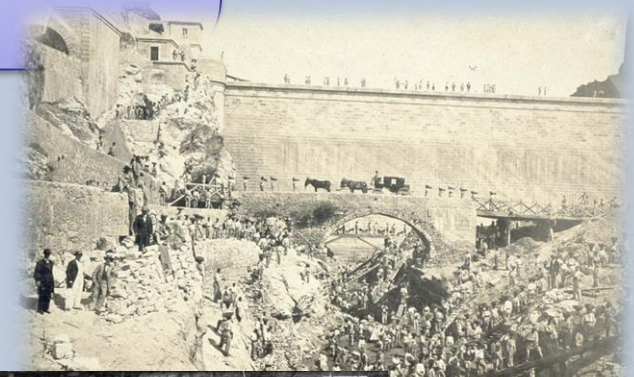
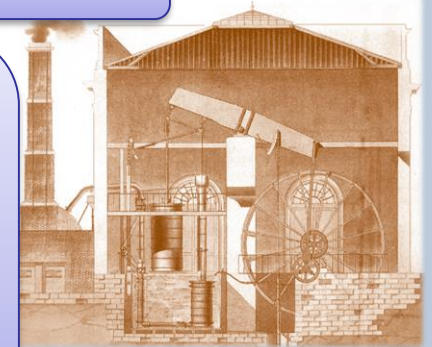
1928: Canfranc International Railway Station France-Spain.

1963: 2nd Spanish School Civil Engineering, Santander.

1966: End of *Escuela Especial*, foundation of *Instituto Politécnico de Madrid*.

1970: General Education Act *Universidad Politécnica de Madrid*.

1994: 1st Materials Engineering programme in Spain.





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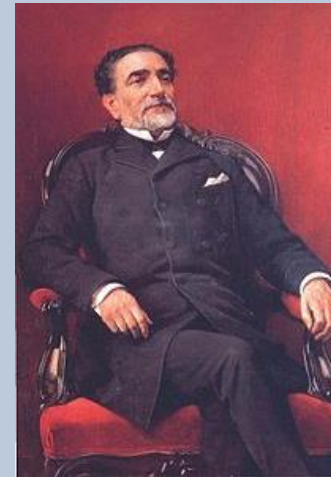
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Key role in the cultural and political life



Visit of King Juan Carlos I
200th Anniversary (2002)



Práxedes Mateo Sagasta
(1825-1903)
Prime Minister (1881-3, 1885-
90, 1892-95, 1897-99, 1901-2)



Leopoldo Calvo-Sotelo
(1926-2008)
Prime Minister (1981-1982)



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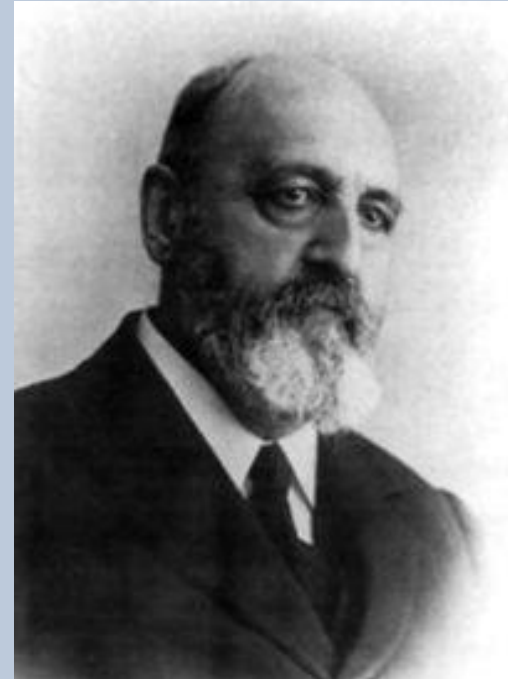
Key role in the cultural and political life



José Echegaray (1832-1916)
Nobel Prize for Literature, 1904



Juan de la Cierva (1895-1936)
Inventor of the gyroplane, first
helicopter



Leonardo Torres Quevedo (1852-1936)
Inventor: Aerostatics, Chess
Automaton, Analog Calculating
Machine, the Niagara Aerocar at
Niagara falls



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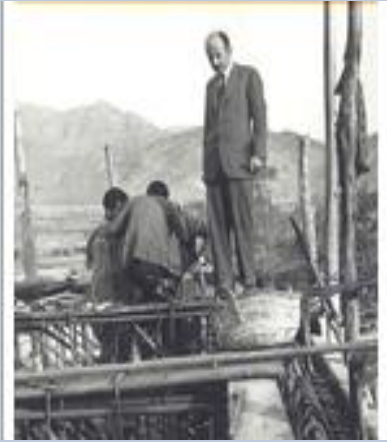
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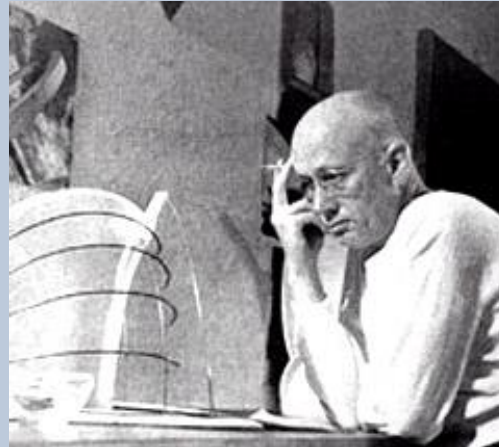
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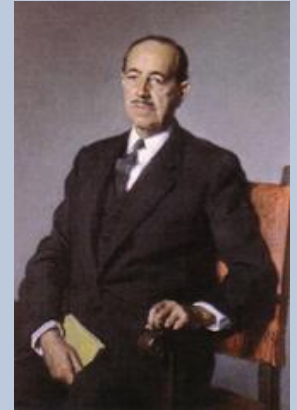
Key role in the cultural and political life



Carlos Fernández Casado
(1905-1988)
Bridge engineering

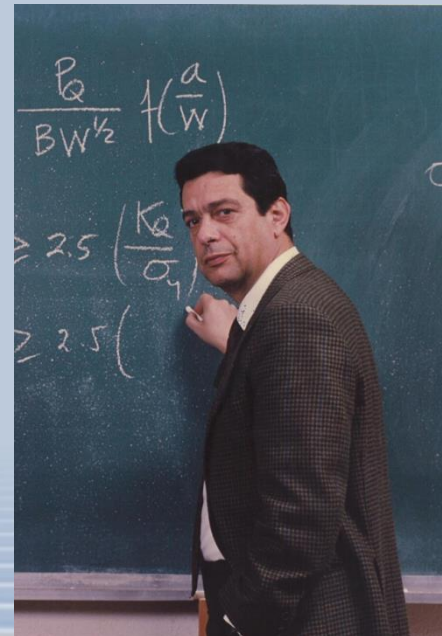
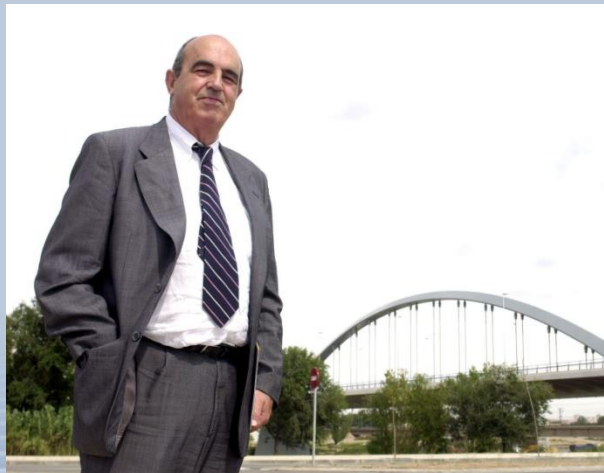


Eduardo Torroja Miret
(1899-1961)
Concrete construction



José Entrecanales
Ibarra (1899-1990)
Geotechnics

Javier Manterola
(1936-)
Bridge
engineering



Manuel Elices
(1938-)
Materials
engineering, US
National Academy
of Engineering



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Key role in the cultural and political life



Florentino Pérez (1947-)
President ACS Dragados
President Real Madrid



Jesús Posada (1945-)
President of the Spanish
Parliament.



Alfonso Reyes (1971-)
Basketball player.

Presidents of companies of IBEX-35*: 6 / 35

*Main index of Madrid Stock Exchange



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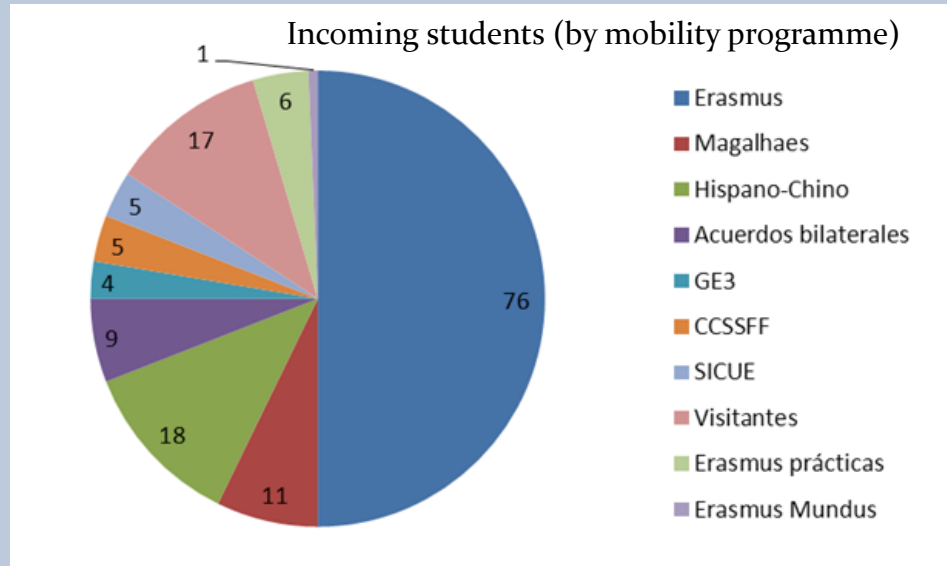
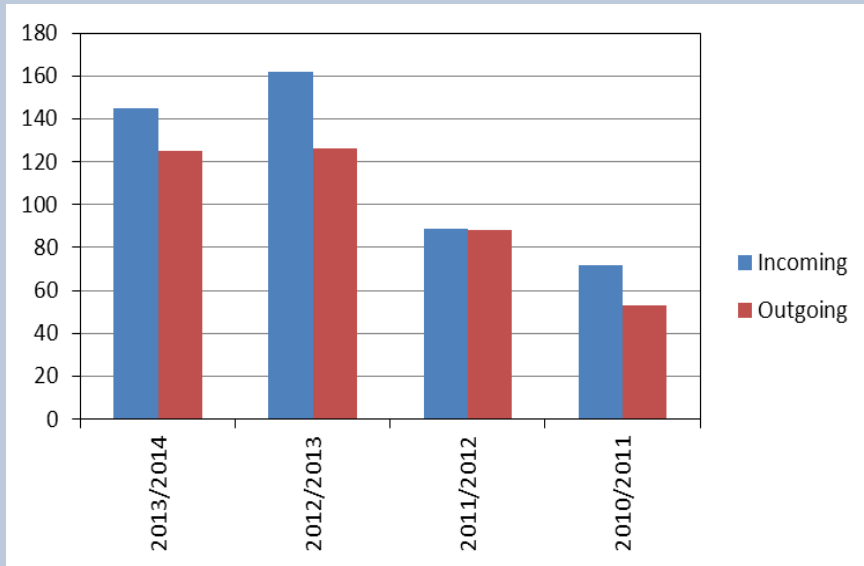
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Internationalization Statistics Incoming/Outgoing



Possibilities for students from TUM

Erasmus+: 1 or 2 semesters

Double degree programme at Master level



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Double Degree Programmes

Partner University	Degree achieved abroad
 Beihang University, School of Transportation Science and Engineering. Beijing, China	Master of Engineering
 École Nationale des Ponts et Chaussées. Paris, France	Diplome d'ingénieur
 HEC École des Hautes Études Commerciales. Paris, France	Master of Science in Management, Diplome de la Grande École HEC
 Illinois Institute of Technology, Armour College of Engineering, Dept. Civil, Architectural and Environmental Engineering, Chicago IL, USA.	Master of Science in Civil Engineering
 Institut National des Sciences Appliquées (INSA) de Lyon. Villeurbanne, France	Diplome d'ingénieur
 KTH Royal Institute of Technology, School of Architecture and the Built Environment, Stockholm, Sweden	Master of Science of Engineering - Civilingenjör
 Pontificia Universidad Católica del Perú, Facultad de Ciencias e Ingeniería, Lima, Perú.	Ingeniero Civil
 Technische Universität München, Fakultät Bau, Geo und Umwelt, Munich, Germany.	Master of Science Bauingenieurwesen, or Master of Science Umweltingenieurwesen
 Universidade Federal de Rio de Janeiro, Escola Politécnica, Rio de Janeiro, Brasil	Engenheiro Civil
 Université de Liège. Faculté des Sciences Appliquées, Liege, Belgium.	Master Ingénieur civil des constructions

ENCIA
CIONAL



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Why internationalization?

THE TOP 250 GLOBAL CONTRACTORS		
RANK		FIRM
2013	2012	
1	2	China Railway Construction Corp. Ltd., Beijing, China
2	1	China Railway Group Ltd., Beijing, China
3	3	China State Construction Eng'g Corp., Beijing, China
4	6	Grupo ACS, Madrid, Spain
5	4	VINCI, Rueil-Malmaison, France
6	5	China Communications Construction Group Ltd., Beijing, China
7	7	HOCHTIEF AG, Essen, Germany
8	8	BOUYGUES, Paris, France
9	9	China Metallurgical Group Corp., Beijing, China
10	10	Bechtel, San Francisco, Calif., U.S.A.
19	17	FCC, Fomento de Constr. y Contratas SA, Madrid, Spain
43	40	OHL SA (Obrascon Huarte Lain SA), Madrid, Spain



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Caminos, y Puertos



Why internationalization?

35,000 million EUR

PROYECTO	23	6	18	7	2	4	9
Lugar del proyecto (Pais)	Toronto (Canadá)	Ottawa (Canadá)	Montreal (Canadá)	Edimburgo (R. Unido)	Londres (R. Unido)	Londres (R. Unido)	Londres (R. Unido)
Presupuesto*	304	1.552	1.480	917	900	600	348
Constructora	FCC	ACS	OHL	ACS	FERROVIAL	FERROVIAL	ACS

* En millones de euros

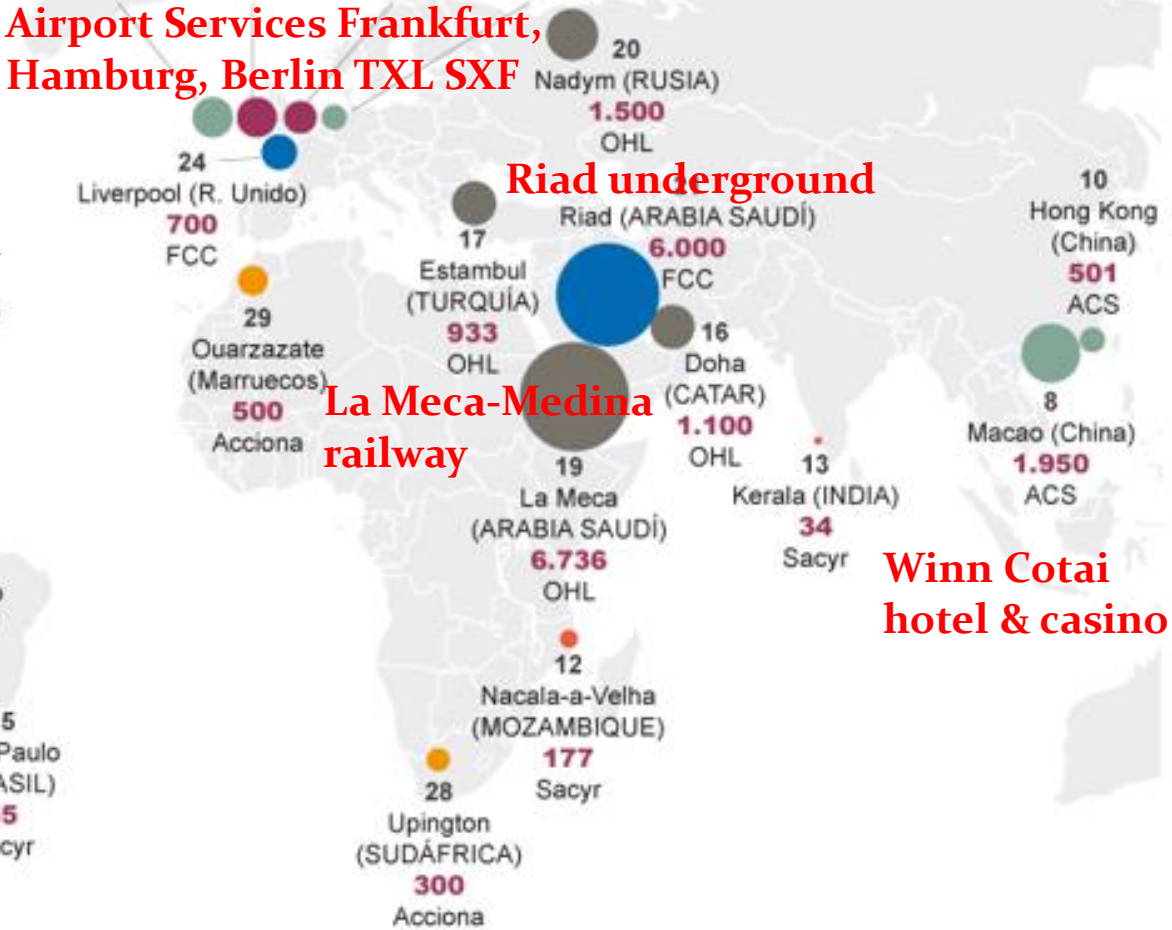
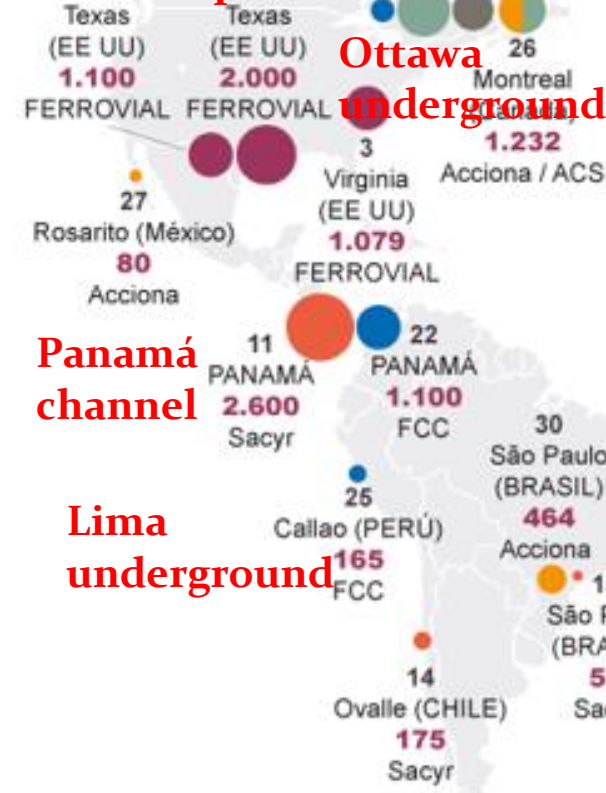
LBJ Express, North Tarrant Express

Airport Services Frankfurt, Hamburg, Berlin TXL SXF

Riad underground

La Meca-Medina railway

Winn Cotai hotel & casino



Panamá channel

Lima underground



Education

The following degrees are offered by our School:

Ingeniero de Caminos, Canales y Puertos
Diploma in Civil Engineering (to be discontinued)

Grado en Ingeniería Civil y Territorial
B Eng, Civil Engineering (240 ECTS)

Ingeniero de Materiales
B Eng, Materials Engineering (240 ECTS)

Máster Ingeniero de Caminos, Canales y Puertos
M Eng, Civil Engineering (120 ECTS)

Professional qualification

Máster Ingeniero de Materiales
M Eng, Materials Engineering (72 ECTS)

Multidisciplinary: between science and engineering

Máster y Doctorado Ingeniería de Estructuras, Cimentaciones y Fundamentos
M Sc and PhD, Structural, Foundations and

International exchange and double degree programmes

Máster y Doctorado en Sistemas de Ingeniería Civil
M Sc and PhD, Civil Engineering Systems

Research





Civil Engineering Studies

Ingeniero de Caminos, Canales y Puertos: 4-year **B Eng** + 2-year **M Eng**

Bachelor	8	Technological subjects: 3 specializations:											History, Art and Aesthetics in Civil Eng		Bachelor's Thesis					
	7	1) Civil constructions, 2) Hydrology, 3) Transports and urban planning																	Roads	
	6	Civil Eng. and Environment		Maritime Works			Hydraulic Infraestructures			Sanitary Engineering			Geotechnics		Concrete and Steel Structures					
	5	General Process of Construction				Hydraulics and Hydrology				Urban Planning			Soil and Rock Mechanics		Structural Analysis		Computational Mechanics			
	4	Differential Equations		Construction and Building Materials II			Electrical Engineering				Geology for Engineers II		Strength of Materials			Mechanics				
	3	Field Theory		Construction and Building Materials I			English Language				Geology for Engineers I		Physics of Solids and Fluids			Topography and Cartography				
	2	Statistics and Optimization				Calculus II				Chemistry of Materials		Physics				Graphic Design				
	1	Linear Algebra and Geometry				Calculus I				Business Administration				Computer Science		Graphic Expression				
ECTS	1.5	3	4.5	6	7.5	9	10.5	12	13.5	15	16.5	18	19.5	21	22.5	24	25.5	27	28.5	30

Lectures in Spanish





Civil Engineering Studies

Ingeniero de Caminos, Canales y Puertos: 4-year **B Eng** + 2-year **M Eng**

Master	4	Technological subjects: 4 specializations: 1) Hydraulics, energy and environment, 2) Transports and urban planning, 3) Project and construction management and finance, 4) Structures, Geotechnics, Construction and Materials														Master's Thesis					
	3	Energetic systems									Planning and management of roads		Structural typology		Hydraulic constructions			Geotechnical engineering			
	2	Applied economics		Hydraulic resources		Technical hydraulics			Applied elasticity			Computational methods for civil engineering			Railway systems						
	1	Mathematic models for civil engineering				Continuum Thermomechanics		Engineering and territory		Water supply and water treatment		Ports and coasts		Transport systems							
ECTS		1.5	3	4.5	6	7.5	9	10.5	12	13.5	15	16.5	18	19.5	21	22.5	24	25.5	27	28.5	30

Professional qualification





Specializations– Máster Ingeniero de Caminos, Canales y Puertos

SPECIALIZATIONS: LIST OF OPTIONAL SUBJECTS (4.5 ECTS each subject)

Students must choose 1 subject from the whole list and 5 subjects from the desired specialization

Hydraulics, energy and environment	Transports and urban planning	Project and construction management and finances	Structures, Geotechnics, Construction and Materials	Combined option: choose 6 subjects from the whole
Hydroelectric engineering Control of hydraulic systems Environmental hydraulic engineering Analysis of hydraulic systems Dams Nuclear engineering and environment Marine energy Assessment of environmental impact Energetic uses in sanitary engineering	Demand transport models Railway technology Airports Advanced design of linear works Port management Shapes in civil engineering Integral management of coastal areas Sustainable territorial planning Urban projects & planning	Cooperation projects in civil eng. Labour health and accessibility in construction Manag., direction & planning of civil eng. proj. Risk assessment in civil eng. projects Economy applied to public works Business administration in constr. & consulting National and international legal aspects Finance & manag. of infrastructures and public works	Morphology of bridges Design, analysis and construction of bridges Analysis & design of steel & composite struct. Analysis & design of concrete struct. Dynamic & seismic structural analysis Nonlinear analysis of structures Rock engineering Soil structures Geological engineering Geomatic techniques in civil eng. Integral management of construction materials Innovation in construction processes Structural integrity Structural composite materials Conservation, assessment & rehabilitation of struct. Experimental structural analysis	

Optional subjects in English from academic year 2015-2016





Double Degree Civil Engineering

TUM

Bachelor, 1st year

Bachelor, 2nd year

Bachelor, 3rd year

Master, 1st year

Master, 2nd year

UPM

Bachelor, 1st year

Bachelor, 2nd year

Bachelor, 3rd year

Bachelor, 4th year

Master, 1st year

Master, 2nd year

90 ECTS (including
Master's Thesis)





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International office
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UPM

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www.caminos.upm.es/internacional/index.htm



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Thanks for coming!

Hope to see you soon in Madrid!



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