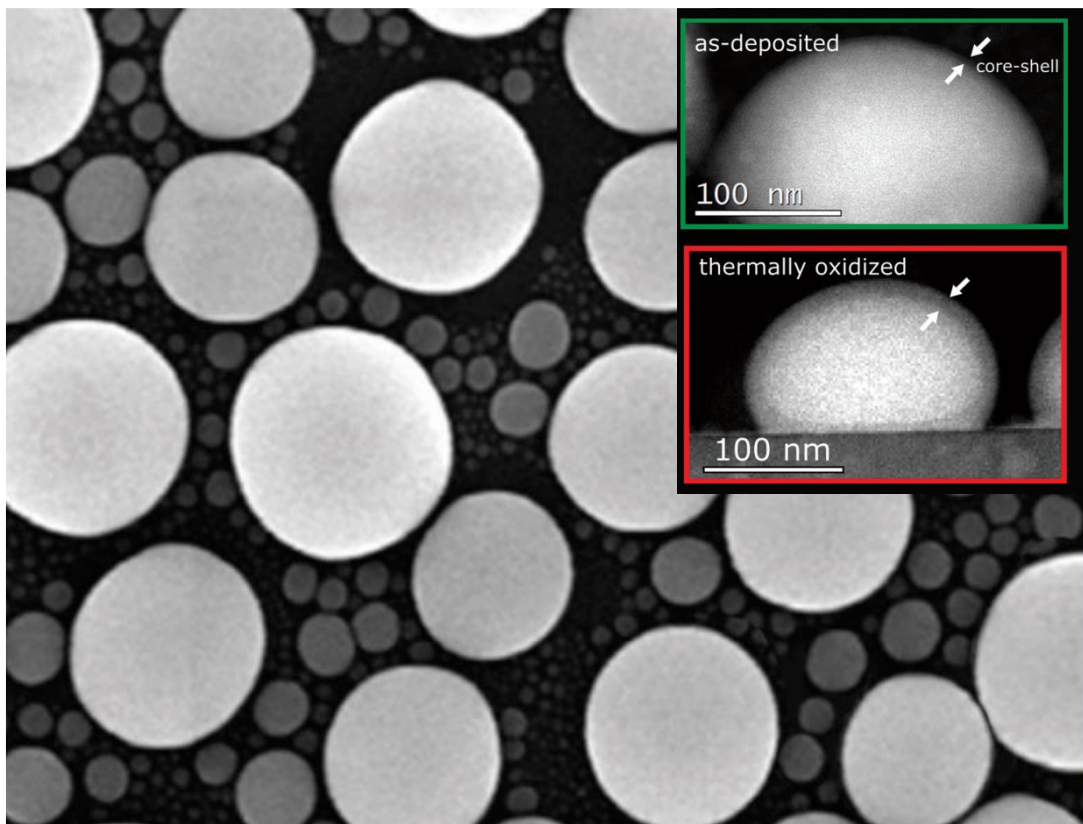


LEARNING GUIDE

2022- 2023

MASTER'S DEGREE IN MATERIALS ENGINEERING



S. Catalán, Nanotechnology Vol 28, No 40



UNIVERSIDAD POLITÉCNICA DE MADRID

ESCUELA TÉCNICA SUPERIOR DE
INGENIEROS DE CAMINOS, CANALES Y PUERTOS

Summary of the teaching programme of the academic year **2022-23**

of the official Master's Degree

Master en Ingeniería de Materiales **Master's Degree in Materials** **Engineering**

This document contains a summary of the teaching programme of the studies of "Master in Materials Engineering" of the academic year 2022-23 and the corresponding subjects of the syllabus.

The studies of "Master in Materials Engineering" (*Master en Ingeniería de Materiales*) take place at the School of Civil Engineering "E.T.S. Ingenieros de Caminos, Canales y Puertos" of Universidad Politecnica de Madrid (UPM).

It has been designed as a natural specialization of the "*Grado en Ingeniería de Materiales*" (Bachelor's Degree in Materials Engineering). However, it is also addressed to students from other scientific or technical degrees interested in the broad field of materials science and engineering.

This programme, with a duration of 18 months, was first offered in the academic year 2013-2014. The subjects are entirely taught in English. However, some subjects can also be offered in Spanish depending of the needs of enrolled students.

This guide is intended to provide students with a unified document to simplify access to relevant information. It describes the syllabus, academic calendar, timetable of the subjects, and the schedule of the exams. In the second part, the document contains additional information of the subjects, including a summary of their contents, evaluation methods and teaching staff. Nevertheless, the guide might not be completely updated. Detailed information can be found in the University platforms GAUSS (subject management, official) and MOODLE (teaching, updated by each lecturer).



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Syllabus of the Master's Degree in Materials Engineering

The curriculum of the Master's Degree in Materials Engineering of the Technical University of Madrid was officially approved by the Spanish Consejo de Universidades (Council for Universities) in 2013 and published in "Boletín Oficial del Estado".

Students have to complete 72 ECTS credits. 60 of them correspond to ordinary subjects and 12 to the final Master's thesis. The curriculum is composed of two semesters with 30 credits each. The currently offered specializations are as follows:

- Master's Degree in Materials Engineering (no major): students have to pass 30 ECTS corresponding to the common set of subjects (fall semester) plus 30 ECTS in the Spring semester (all subjects are considered elective) and the final Master's thesis (12 ECTS).
- Master's Degree in Materials Engineering (major in Structural Materials): students have to pass 30 ECTS corresponding to the common set of subjects (fall semester) plus 30 ECTS in the Spring semester corresponding to the Structural Materials subjects (A) and the final Master's thesis (12 ECTS).
- Master's Degree in Materials Engineering (major in Functional Materials): students have to pass 30 ECTS corresponding to the common set of subjects (fall semester) plus 30 ECTS in the Spring semester corresponding to the Functional Materials subjects (B) and the final Master's thesis (12 ECTS).

The table below specifies the list of subjects, their size in ECTS and the semester in which they are taught.

First semester (Fall)	ECTS	Type
Common block of subjects	30	
314 Structural Characterization of Materials I: Microscopy and Diffraction	5	Mandatory
315 Structural Characterization of Materials II: Spectroscopy	5	Mandatory
316 Mechanical Characterization and Analysis	4	Mandatory
317 Optical, Electrical and Magnetic Characterization of Materials	4	Mandatory
318 Advanced Numerical Methods	3	Mandatory
319 Materials Selection	3	Mandatory
320 Modelling and Simulation in Material Science and Engineering	3	Mandatory
321 Materials Economics and Management	3	Mandatory



**Elective subjects are subjected to be given
if enough students are enrolled**

Second semester (Spring)		
Elective module of subjects E	ECTS	Type
Master in Materiales Engineering (no specific specialization)	30	
The student must complete 30 ECTS among the following subjects:		
322 Forensic Engineering: In Service Failure Analysis	3	Elective
324 Structural Integrity	3	Elective
325 Design and fabrication of advanced composite materials	3	Elective
326 Quality Management and Metrology	3	Elective
327 Advanced Forming Processes	3	Elective
328 Impact Behaviour of Materials	3	Elective
330 Materials Under Extreme In-service Conditions	3	Elective
331 Materials for sport	3	Elective
332 Materials for Transportation	3	Elective
333 Materials for aerospace industry	3	Elective
334 Functional Materials at Macro and Micro/Nanometre Scales	5	Elective
335 New Emerging Materials and Technologies	3	Elective
337 Materials for Electronic and Optoelectronic Devices	4	Elective
338 Materials for Photonic Devices	4	Elective
339 Polymeric materials for advanced applications	3	Elective
340 Materials and applications in nanotechnology	6	Elective
341 Materials and microfabrication technologies for electronic devices	6	Elective
342 Spintronic and Nanomagnetism	3	Elective
344 Biological Materials	4	Elective
349 Regenerative Medicine and Tissue Engineering	3	Elective
356 Materials for Renewable Energies	6	Elective

 Second semester (Spring)

Elective module of subjects A

ECTS

Type

Master in Materiales Engineering (Structural Materials)
30
The student must complete 30 ECTS among the following subjects:

322 Forensic Engineering: In Service Failure Analysis	3	Elective
324 Structural Integrity	3	Elective
325 Design and fabrication of advanced composite materials	3	Elective
326 Quality Management and Metrology	3	Elective
327 Advanced Forming Processes	3	Elective
328 Impact Behaviour of Materials	3	Elective
330 Materials Under Extreme In-service Conditions	3	Elective
331 Materials for sport	3	Elective
332 Materials for Transportation	3	Elective
333 Materials for aerospace industry	3	Elective

 Second semester (Spring)

Elective module of subjects B

ECTS

Tipo

Master in Materiales Engineering (Functional Materials)
30
The student must complete 30 ECTS among the following subjects:

334 Functional Materials at Macro and Micro/Nanometre Scales	5	Mandatory
335 New Emerging Materials and Technologies	3	Elective
337 Materials for Electronic and Optoelectronic Devices	4	Elective
338 Materials for Photonic Devices	4	Elective
339 Polymeric materials for advanced applications	3	Elective
340 Materials and applications in nanotechnology	6	Elective
341 Materials and microfabrication technologies for electronic devices	6	Elective
342 Spintronic and Nanomagnetism	3	Elective



Teaching schedule overview

Subject Coordination

The coordination of the Master is carried out at the Escuela Superior de Ingenieros de Caminos Canales y Puertos of the Universidad Politécnica de Madrid. Most of the lectures are given at this school, however, some of the lectures may be given at different schools including laboratories and different facilities.

The Master is an inter-faculty programme and many departments and schools participate in it. Currently, the different Schools of the University that take part in the lectures, laboratories and support the teaching are the following:

- ETSI Aeronautica y el Espacio (School of Aerospace Engineering)
- ETSI Caminos Canales y Puertos (School of Civil Engineering)
- ETSI Industriales (Industrial-mechanical, chemical and electrical-Engineering)
- ETSI Minas y Energía (School of Mines)
- ETSI Telecomunicacion (Telecommunications and Electronics)

And the different Departments of the University that support the Master giving lectures and providing laboratories are the following:

- Ciencia de Materiales
(ETSI Caminos, Canales y Puertos)
- Física Aplicada e Ingeniería de Materiales
(ETSI Industriales)
- Ingeniería Electrónica
(ETSI de Telecomunicación)
- Ingeniería Energética
(ETSI Industriales)
- Ingeniería Geológica y Minera
(ETSI de Minas y Energía)
- Ingeniería de Organización, Administración de Empresas y Estadística
(ETSI Industriales)
- Ingeniería Química Industrial y del Medio Ambiente
(ETSI Industriales)
- Materiales y Producción Aeroespacial
(ETSI Aeronáutica y del Espacio)
- Tecnología Fotónica y Bioingeniería
(ETSI Telecomunicación)

Subjects and lecturers

Coordination		email
José María Ulloa	Academic coordinator of the Master's Degree	coordinacion.ing-materiales.caminos@upm.es
Javier San Felipe	Administrative secretary	secretaria.ing-materiales.caminos@upm.es

FIRST SEMESTER (Autum)

Code ECTS Subject

43000314 5 Structural Characterization of Materials I: Microscopy and Diffraction

Coordinador	Marta Clement Lorenzo	marta.clement@upm.es
	Jimena Olivares Roza	jimena.olivares@upm.es
	Luisa Ruiz González	luisarg@quim.ucm.es

43000315 5 Structural Characterization of Materials II: Spectroscopy

Coordinador	Raquel Gonzalez Arrabal	raquel.gonzalez.arrabal@upm.es
	Federico Sket	federico.sket@imdea.org

43000316 4 Mechanical Characterization and Analysis

Coordinador	Elena María Tejado Garrido	elena.tejado@upm.es
	Jose Ygnacio Pastor Caño	jy.pastor@upm.es

43000317 4 Optical, Electrical and Magnetic Characterization of Materials

Coordinador	Javier Martínez Rodrigo	javier.martinez@upm.es
	José María Ulloa Herrero	josem.ulloa@upm.es
	José Luis Prieto Martín	joseluis.prieto@upm.es

43000318 3 Advanced Numerical Methods

Coordinador	Javier Segurado Escudero	javier.segurado@upm.es
	Valentín de la Rubia Hernández	valentin.delarubia@upm.es
	Víctor Rey de Pedraza Ruiz	v.rey@upm.es
	Jaime Otero García	jaime.otero@upm.es

43000319 3 Materials Selection

Coordinador	José Ygnacio Pastor Caño	jy.pastor@upm.es
	Elena María Tejado Garrido	elena.tejado@upm.es

43000320 3 Modeling and Simulation In Material Science and Engineering

Coordinador	Fco. Javier Llorca Martínez	javier.llorca@upm.es
	Carlos D. González Martínez	c.gonzalez@upm.es
	Alvaro Ridruejo Rodríguez	alvaro.ridruejo@upm.es

43000321 3 Materials Economics and Management

Coordinador	M ^a Dolores Storch de Gracia Calvo	lola.storch@upm.es
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SECOND SEMESTER (Spring)		
<i>Code</i>	<i>ECTS</i>	<i>Subject</i>
43000322	3	Forensic Engineering: In Service Failure Analysis
Coordinador	Nuria Martín Piris	nuria.mpiris@upm.es
	Daniel Barba Cancho	daniel.barba@upm.es
43000324	3	Structural Integrity
Coordinador	David A. Cendón Franco	david.cendon.franco@upm.es
43000325	3	Design and fabrication of advanced composite materials
Coordinador	Carlos D. Gonzalez Martínez	c.gonzalez@upm.es
	Fco. Javier LLorca Martínez	javier.llorca@upm.es
	Álvaro Ridruejo Rodríguez	alvaro.ridruejo@upm.es
43000326	3	Quality Management and Metrology
Coordinador	José Manuel Ruiz Román	josemanuel.ruizr@upm.es
43000327	3	Advanced Forming Processes
Coordinador	Luis E. García Cambroneró	luis.gcambronero@upm.es
43000328	3	Impact Behaviour of Materials
Coordinador	Francisco R. Gálvez Díaz-Rubio	f.galvez@upm.es
	David A. Cendón Franco	david.cendon.franco@upm.es
	Rafael Sancho Cadenas	rafael.sancho@upm.es
	Víctor Rey de Pedraza Ruiz	v.rey@upm.es
43000330	3	Materials Under Extreme In-service Conditions
Coordinador	Elena María Tejado Garrido	elena.tejado@upm.es
	José Ygnacio Pastor Caño	jy.pastor@upm.es
43000331	3	Materials for sport
Coordinador	M ^a Victoria Alcázar Montero	mariavictoria.alcazar@upm.es
43000332	3	Materials for Transportation
Coordinador	Javier Oñoro López	javier.onoro@upm.es
	Carlos Bueno Blanco	Carlos.buenob@upm.es
43000333	3	Materials for aerospace industry
Coordinador	Daniel Barba Cancho	daniel.barba@upm.es
	Nuria Martín Pirís	nuria.mpiris@upm.es
	Ignacio Luque Trujillo	ignacio.luque@upm.es
	M ^a Vega Aguirre Cebrián	mariavega.aguirre@upm.es
	Conrado Luis Garrido Fernández de Vera	conrado.garrido@upm.es
43000334	5	Functional Materials at Macro and Micro/Nanometer Scales
Coordinador	Žarko Gacević	zarko.gacevic@upm.es
43000335	3	New Emerging Materials and Technologies
Coordinador	Fernando Calle Gómez	fernando.calle@upm.es
43000337	4	Materials for Electronic and Optoelectronic Devices
Coordinador	Adrián Hierro Cano	adrian.hierro@upm.es

SECOND SEMESTER (Spring)

<i>Code</i>	<i>ECTS</i>	<i>Subject</i>
43000338	3	Materials for Photonic Devices
Coordinador	Morten A. Geday Patxi Xabier Quintana Arregui Manuel Caño García	morten.geday@upm.es x.quintana@upm.es manuel.c@upm.es
43000339	3	Polymeric materials for advanced applications
Coordinador	M ^a Victoria Alcázar Montero	mariavictoria.alcazar@upm.es
43000340	6	Materials and applications in nanotechnology
Coordinador	Fernando Calle Gómez Jorge Pedrós Ayala M ^a Ángeles Pampillón	fernando.calle@upm.es j.pedros@upm.es ma.pampillon@upm.es
43000341	6	Materials and microfabrication technologies for electronic devices
Coordinador	Jimena Olivares Roza Marta Clement Lorenzo	jimena.olivares@upm.es marta.clement@upm.es
43000342	3	Spintronics and nanomagnetism
Coordinador	José Luis Prieto Martín	joseluis.prieto@upm.es
43000344	4	Biological Materials
Coordinador	Francisco J. Rojo Pérez Gustavo V. Guinea Tortuero Gustavo R. Plaza Baonza Blanca R. González Bermúdez	fj.rojo@upm.es gustavovictor.guinea@upm.es gustavo.plaza@upm.es blanca.gbermudez@upm.es
43000349	3	Regenerative Medicine and Tissue Engineering
Coordinador	José Pérez Rigueiro Núria Marí Buyé	jose.perez@upm.es nuria.mari@upm.es
43000356	6	Materials for Renewable Energies
Coordinador	Jose Ygnacio Pastor Caño Elena María Tejado Garrido	jy.pastor@upm.es elena.tejado@upm.es



Academic calendar

This calendar is subjected to official changes or modifications

Relevant dates are shown below for the academic year 2022-23. They have been scheduled according to UPM regulations.

- **Lectures of the first semester:** September 5, 2022 to December 22, 2022
- **Regular exams of the first semester:** January 9, 2023 to January 26, 2023
- **Lectures of the second semester:** January 30, 2023 to May 23, 2023
- **Regular exams of the second semester:** May 29, 2023 to June 14, 2023
- **Extraordinary exams:** June 22, 2023 to July 14, 2023

Important dates and list of dates without lectures:

September 5, 2022	Presentation. Beginning of lectures
October 6, 2022	Activities at Caminos School (no lectures: nL)
October 12, 2022	Columbus's Day (nL)
November 1, 2022	All Saints Day (nL)
November 9, 2022	Local bank holiday (nL)
December 6, 2022	"Día de la Constitución" (nL)
December 8, 2022	Nationwide bank holiday (nL)
December 23, 2022	Beginning of Christmas Holidays (nL)
January 30, 2023	Beginning of lectures of the second semester
February 21, 2023	Activities at Caminos School (nL)
April 3, 2023	Beginning of Easter Holidays (nL)
April 11, 2023	End of Easter Holidays. Lectures resumed.
May 1, 2023	Workers' Day (Sunday, nL)
May 2, 2023	Region of Madrid Day (nL)
May 12, 2023	St. Domingo de la Calzada, Patron Saint of School (nL)
15 May 2023	Patron Saint of Madrid, (Sunday, nL)
23 May 2023	End of lectures

CALENDARIO ESCOLAR
 (2022-2023)
 Para titulaciones de Grado y Máster Universitario
 de la Universidad Politécnica de Madrid
 Aprobado por el Consejo de Gobierno el 26 de mayo de 2022

— PRIMER CUATRIMESTRE —

Info Code Académico

Julio 2022

L	M	J	V	S	D
		1	2	3	
4	5	6	7	8	9
10	11	12	13	14	15
16	17	18	19	20	21
22	23	24	25	26	27
28	29	30	31		

Agosto 2022

L	M	J	V	S	D
1	2	3	4	5	6
7					

Septiembre 2022

L	M	J	V	S	D
		1	2	3	4
5	6	7	8	9	10
11	12	13	14	15	16
17	18	19	20	21	22
23	24	25	26	27	28
29	30	31			

Octubre 2022

L	M	J	V	S	D
				1	2
3	4	5	6	7	8
9	10	11	12	13	14
15	16	17	18	19	20
21	22	23	24	25	26
27	28	29	30	31	

Días Festivos

12 OCT	Miércoles	Fiesta Nacional de España
01 NOV	Viernes	Todos los Santos
09 NOV	Miércoles	Nuestro Señero de la Almudena
06 DIC	Viernes	Día de la Constitución
08 DIC	Jueves	La Inmaculada Concepción
25 DIC	Domingo	Navidad del Señor
01 ENE	Domingo	Año Nuevo
06 ENE	Viernes	Epifanía del Señor
28 ENE	Sábado	Santo Tomás de Aquino

Comienzo de las clases a partir del 5 de septiembre

Noviembre 2022

L	M	J	V	S	D
		1	2	3	4
5	6	7	8	9	10
11	12	13	14	15	16
17	18	19	20	21	22
23	24	25	26	27	28
29	30				

Diciembre 2022

L	M	J	V	S	D
		1	2	3	4
5	6	7	8	9	10
11	12	13	14	15	16
17	18	19	20	21	22
23	24	25	26	27	28
29	30	31			

Enero 2023

L	M	J	V	S	D
				1	2
3	4	5	6	7	8
9	10	11	12	13	14
15	16	17	18	19	20
21	22	23	24	25	26
27	28	29	30	31	

Febrero 2023

L	M	J	V	S	D
		1	2	3	4
5	6	7	8	9	10
11	12	13	14	15	16
17	18	19	20	21	22
23	24	25	26	27	28
29					

□ Feriado ● Inicio ○ Fin

CALENARIO ESCOLAR (2022-2023)
para titulaciones de Grado y Máster Universitario de la Universidad Politécnica de Madrid
Aprobado por el Consejo de Gobierno el 26 de mayo de 2022

– SEGUNDO CUATRIMESTRE –

Enero 2023

L	M	J	V	S	D
					31

Febrero 2023

L	M	J	V	S	D
1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30

Marzo 2023

L	M	J	V	S	D
6	7	8	9	10	11
12	13	14	15	16	17
18	19	20	21	22	23
24	25	26	27	28	29
30	31				

Abril 2023

L	M	J	V	S	D
3	4	5	6	7	8
9	10	11	12	13	14
15	16	17	18	19	20
21	22	23	24	25	26
27	28	29	30		

Mayo 2023

L	M	J	V	S	D
1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31					

Junio 2023

L	M	J	V	S	D
5	6	7	8	9	10
11	12	13	14	15	16
17	18	19	20	21	22
23	24	25	26	27	28
29	30	31			

Julio 2023

L	M	J	V	S	D
3	4	5	6	7	8
9	10	11	12	13	14
15	16	17	18	19	20
21	22	23	24	25	26
27	28	29	30	31	

Agosto 2023

L	M	J	V	S	D
1	2	3	4	5	6

Días Festivos

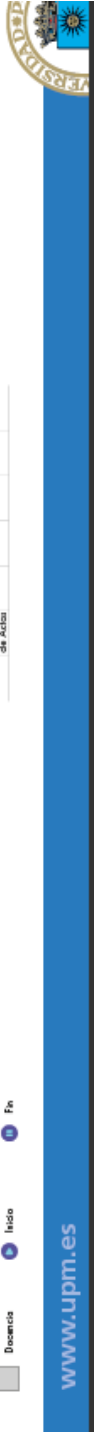
03 ABR	Lunes	Comienzo de vacaciones de semana Santa
06 ABR	Jueves	Jueves Santo
07 ABR	Viernes	Viernes Santo
01 MAY	Lunes	Día del Trabajo
02 MAY	Martes	Fiesta de la Comunidad de Madrid
15 MAY	Lunes	San Isidro Labrador
15 AGO	Norma	La Asunción de Nuestra Señora

* El estudiante podrá realizar aplicación restringida de matrícula inintermitente; trabajos oficiales con asistencia en el segundo semestre; congresos con asistencia restringida (sólo en el caso de que se realicen en el primer semestre) y/o la tesis doctoral; TFG, TFM, tesis de licenciatura y/o congresos y EIMC. Además se podrá aplicar hasta un máximo de 12 ECTS de asignaturas de segundo semestre.

Este calendario está sujeto a los posibles cambios que se deriven con carácter oficial.

Docencia
 Inicio
 Fin

www.upm.es



Recommendations for registering

The goal of this section is to provide you with some guidelines regarding your choice of subjects. The academic programme is composed of a first semester of compulsory subjects (Fall semester, S1) and a second one of elective subjects (Spring semester, S2), plus the compulsory Master's Thesis (TFM). Unless you wish to complete the programme at a slower pace due to professional or other commitments, the standard choice is to enroll in the full set of compulsory subjects (30 ECTS).

With elective subjects (S2) we face a challenge: among the offered subjects, we cannot guarantee that a subject will be taught unless a minimum threshold of students (about 5 of them) is reached. To sort this problem out, we can provide the following suggestion: select at least 30 ECTS of elective subjects among those offered by the system. Of course, try to select those you are mainly interested in, and select payment in instalments ('pago fraccionado'). During the first weeks of class we will submit you a questionnaire about the elective subjects. The teaching staff will be informed about the results and a decision on which elective subjects are to be taught will be made. **You will be able to modify your enrolment without extra costs either from September 5 to September 9, or by de-registering in February (Feb. 1 to Feb. 7).** Regardless of the number of students, please notice that only a limited number of elective subjects regarding biological materials and materials for energy can be currently offered by the University.

Lastly, the Master's thesis (TFM) can be done during the first year, but this can be quite a demanding effort and experience shows that students usually prefer to complete their thesis in the second year, after the regular subjects. This is the reason why we do not recommend registration for TFM when entering the programme.



Timetable of lectures

The timetable of the lectures for the first semester is shown on the following page. However, timetables of the second semester will be scheduled in November depending on the enrollment of students.

Lectures typically start at 15.00 and end at 20.00. However, some subjects may include some slots during the morning due to the availability of the different laboratories. Some elective subjects (all corresponding to the Spring semester) are taught in the morning to avoid overlapping with others.

Lectures of the first semester starts in September and end in December.

Lectures of the second semester starts in the end of January and end in May.

TIMETABLE OF THE FIRST SEMESTER (Compulsory subjects) Classroom 05

Note: the timetable corresponding to the second (Spring) semester will be published on the website in November

S1		MASTER'S DEGREE IN MATERIALS ENGINEERING			Classroom: 05	
		First semester			Mirror classroom: 14	
					2022-2023	
		<i>Lunes</i>	<i>Martes</i>	<i>Miércoles</i>	<i>Jueves</i>	<i>Viernes</i>
15.00	15.10	319. Materials Selection	314. Structural Characterization of Materials 1	317. Optical, Electrical and Magnetic Characterization	315. Structural Characterization of Materials 2	320. Modelling and Simulation in Mat. Sci and Engineering
15.30	16.00		314. Structural Characterization of Materials 1		315. Structural Characterization of Materials 2	
16.30	17.00	316. Mechanical Characterization and Analysis	318. Advanced Numerical Methods	318. Advanced Numerical Methods	317. Optical, Electrical and Magnetic Characterization	
17.30	18.00					
18.30	19.00	316. Mechanical Characterization and Analysis	318. Advanced Numerical Methods	318. Advanced Numerical Methods	317. Optical, Electrical and Magnetic Characterization	
19.30	20.00					
20.30	21.00					



Calendar of exams

Regular exams. First Semester				
Code	Subject	Date	Time	Room
43000319	Materials Selection	9 January 2023	16:00	
43000321	Materials Economics and Management	11 January 2023	16:00	
43000314	Structural Characterization of Materials I: Microscopy and Diffraction	13 January 2023	16:00	
43000318	Advanced Numerical Methods	16 January 2023	16:00	
43000316	Mechanical Characterization and Analysis	18 January 2023	16:00	
43000315	Structural Characterization of Materials II: Spectroscopy	20 January 2023	16:00	
43000317	Optical, Electrical and Magnetic Charact. of Mat.	23 January 2023	16:00	
43000320	Modeling and Sim. in Material Sci. and Engineering	25 January 2023	16:00	
43000360	Master Thesis (+)	26 January 2023	9.00	

(+) To present the Master's Thesis, the student must have completed all subjects



Second-opportunity exams			
Compulsory subjects			
Code	Subject	Date	Time Room
43000321	Materials Economics and Management	27 June 2023	9:00
43000319	Materials Selection	28 June 2023	9:00
43000317	Optical, Elect. and Magnetic Charact. of Materials	30 June 2023	9:00
43000314	Structural Characterization of Materials I: Microscopy and Diffraction	4 July 2023	9:00
43000315	Structural Characterization of Materials II: Spectroscopy	5 July 2023	9:00
43000320	Modelling and Sim. Mat. Science and Engineering	7 July 2023	9:00
43000318	Advanced Numerical Methods	11 July 2023	9:00
43000316	Mechanical Characterization and Analysis	12 July 2023	9:00
43000360	Master Thesis (+)	20 July 2023	9.00

(+) *To present the Master's Thesis, the student must have completed all subjects*

Second-opportunity exams.				
Elective subjects				
Code	Subject	Date	Time	Room
43000334	Functional Mat. at Macro and Micro/Nanometer Scales	22 June 2023	9:00	
43000332	Materials for Transportation	22 June 2023	16:00	
43000326	Quality Management and Metrology	23 June 2023	16:00	
43000338	Materials for Photonic Devices	26 June 2023	9:00	
43000331	Materials for Sport	26 June 2023	16:00	
43000341	Materials and Microfabrication Technologies for Electronic Devices	27 June 2023	16:00	
43000325	Design and Fabrication of Advanced Composite Materials	28 June 2023	16:00	
43000356	Materials for Renewable Energies	29 June 2023	9:00	
43000327	Advanced Forming Processes	29 June 2023	16:00	
43000330	Materials under Extreme in-service Conditions	3 July 2023	9:00	
43000344	Biological Materials	3 July 2023	16:00	
43000337	Materials for Electronic and Optoelectronic Devices	4 July 2023	16:00	
43000335	New Emerging Materials and Technologies	6 July 2023	9:00	
43000322	Forensic Engineering: in-Service Failure Analysis	6 July 2023	16:00	
43000324	Structural Integrity	7 July 2023	16:00	
43000333	Materials for Aerospace Industry	10 July 2023	9:00	
43000349	Tissue Engineering	10 July 2023	16:00	
43000328	Impact Behaviour of Materials	11 July 2023	16:00	
43000339	Polymeric Materials for Advanced Applications	12 July 2023	16:00	

**JANUARY 2023**
Ordinary Exams, first semester

Academic year 2022-2023

	9	10	11	12	13
9:00h					
11:30h					
16:00h					
18:30h	319. Mat. Sel.		321. Mat. Economics and Mngmnt		314. Str. Char. I
9:00h	16	17	18	19	20
11:30h					
16:00h					
18:30h	318. Adv. Num. Meth		316. Mech. Char.		315. Str. Char. II
9:00h	23	24	25	26	27
11:30h				360. Master's Thesis	
16:00h					
18:30h	317. Opt. Char.		320. Mod. Simul.		

MAY-JUNE 2023

Ordinary exams, second semester

Academic year 2022-2023

	29	30	31	1	2
9:00h	322. Forensic	327. Adv. Forming Proc.	338. Mat. Photonic	330. Mat. Extreme	341. Mat Micro Fab. Electr.
11:30h					
16:00h	337. Mat Elec. Opto				
18:30h					
	5	6	7	8	9
9:00h	331. Mat. Sport	344. Biological Materials	339. Polymeric Mat. Adv.	326. Quality Mgmt	332. Transport.
11:30h					
16:00h	333. Mat. Aerospace		349. Tissue Engineering		
18:30h					
	12	13	14	15	16
9:00h	324. Str. Integ.	334. Func. Macro-Micro	356. Renewable Mat.		
11:30h					
16:00h	335. New Emerg.	328. Impact	325. Design Fab. Comp.		
18:30h					
	19	20	21	22	23
9:00h					
11:30h					
16:00h					
18:30h					



JUNE-JULY 2023

Second-opportunity exams

Academic year 2022-2023

9:00h	19	20	21	22 334. Func. Macro-Micro	23
11:30h					
16:00h				332. Transport.	326. Quality Mgmt
18:30h					
9:00h	26 338. Mat. Photonic	27 321. Mat. Eco and Mngmt	28 319. Mat. Sel.	29 356. Renewable Mat.	30 317. Opt. Char.
11:30h					
16:00h	331. Mat. Sport	341. Mat Micro Fab. Electr.	325. Design Fab. Comp.	327. Adv. Forming Proc.	
18:30h					
9:00h	3 330. Mat. Extreme	4 314. Str. Char. I	5 315. Str. Char. II	6 335. New Emerg.	7 320. Mod. Simul.
11:30h					
16:00h	344. Biological Materials	337. Mat Elec. Opto		322. Forensic	324. Str. Integ.
18:30h					
9:00h	10 333. Mat. Aerospace	11 318. Adv. Num. Meth	12 316. Mech. Char.		20 360. Master's Thesis 9:00
11:30h					
16:00h	349. Tissue Engineering	328. Impact	339. Polymeric Mat. Adv.	...	
18:30h					



Information about subjects

There is a learning guide for each subject, which can be consulted on the GAUSS platform of the University, accessible through the Virtual Polytechnic. They can also be consulted on the master website, selecting "courses" in the "enrolled students" tab:

<http://www.materiales.upm.es/master/pages/ES-Courses.asp>

These guides contain all the details about the operation of the subject, in particular:

- Descriptive data
 - Faculty members
 - Recommended prior knowledge
 - Competences and learning outcomes
 - Description of the subject and syllabus
 - Time schedule
 - Activities and evaluation criteria
 - Didactic resources
 - Other relevant information
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