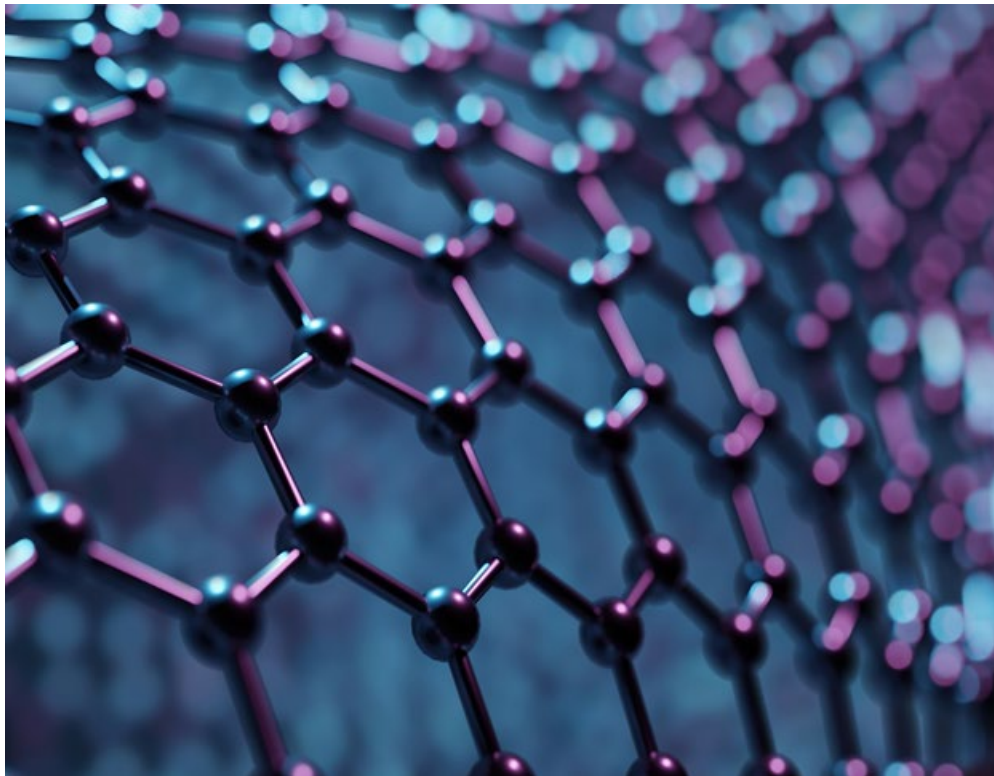


**LEARNING  
GUIDE**

**2023-  
2024**

# **MASTER'S DEGREE IN MATERIALS ENGINEERING**





UNIVERSIDAD POLITÉCNICA DE MADRID  
ESCUELA TÉCNICA SUPERIOR DE  
INGENIEROS DE CAMINOS, CANALES Y PUERTOS

# Summary of the teaching programme of the academic year **2023-24**

of the official Master's Degree

## 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 2023-24 and the corresponding subjects of the syllabus.

The studies of Master in Materials Engineering take place at the School of Civil Engineering "E.T.S. Ingenieros de Caminos, Canales y Puertos" of Universidad Politécnica de Madrid (UPM) at the Ciudad Universitaria Campus:

*Calle Profesor Aranguren s/n, 28040 Madrid*

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.

The programme has a duration of 18 months, it is fully presential and the subjects are entirely taught in English.

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. Detailed information about the subjects can be found in the University platforms GAUSS (subject management, official) and MOODLE (teaching, updated by each lecturer).





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## 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 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 Mecánica  
(ETSI Industriales)
- Ingeniería Química Industrial y del Medio Ambiente  
(ETSI Industriales)
- Materiales y Produccion Aeroespacial  
(ETSI Aeronáutica y del Espacio)
- Tecnología Fotónica y Bioingeniería  
(ETSI Telecomunicación)
- Electrónica Física, Ingeniería Eléctrica y Física Aplicada  
(ETSI Telecomunicación)
- Departamento de Matemática Aplicada a las Tecnologías de la Información y las Comunicaciones  
(ETSI Telecomunicación)







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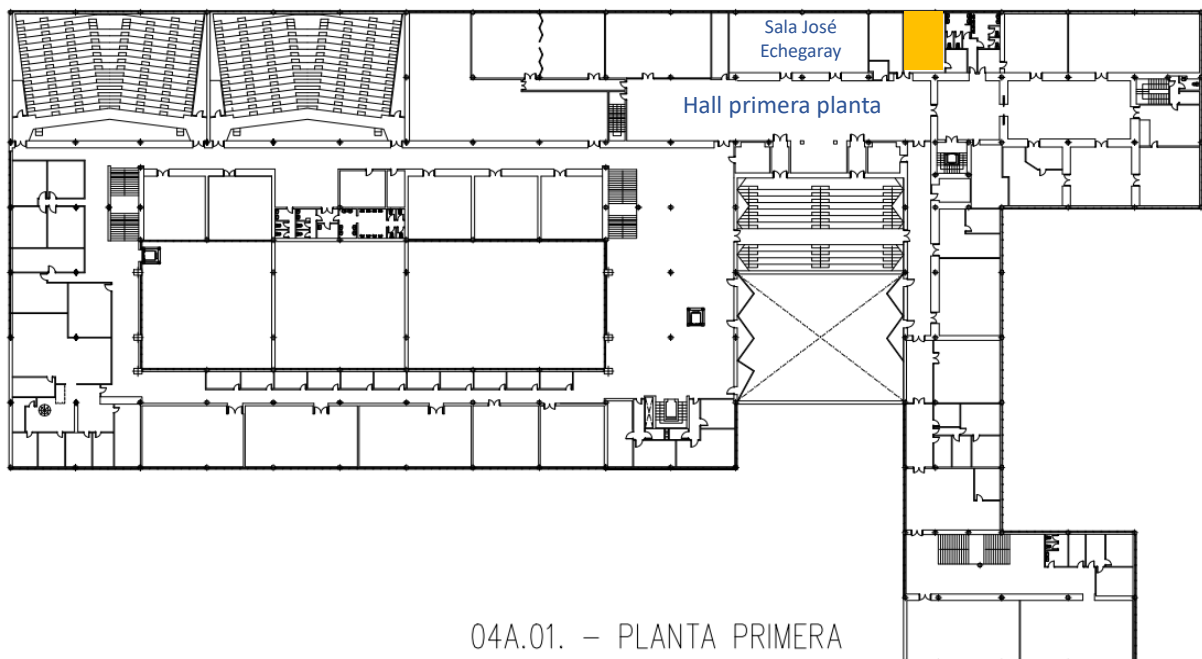
**Administrative Secretary:** Javier San Felipe

*secretaria.ing-materiales.caminos@upm.es*

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The Materials Engineering Secretariat/Coordination office is located on the first floor. Office hours for Secretariat issues are from 9:00 a.m. to 2:00 p.m.

Secretaría/Coordinación Ingeniería de Materiales



## Academic calendar

### *This calendar is subjected to official changes or modifications*

Relevant dates are shown below for the academic year 2023-24. They have been scheduled according to UPM regulations.

- **Lectures of the first semester:** September 5, 2023 to December 22, 2023
- **Regular exams of the first semester:** January 8, 2024 to January 29, 2024
- **Lectures of the second semester:** January 30, 2024 to May 24, 2024
- **Regular exams of the second semester:** May 30, 2024 to June 14, 2024
- **Extraordinary exams:** June 24, 2024 to July 13, 2024

Important dates and list of dates without lectures:

September 5, 2023	Presentation. Beginning of lectures
October 4, 2023	Activities at Caminos School (no lectures: <b>nL</b> )
October 12, 2023	Columbus's Day ( <b>nL</b> )
November 1, 2023	All Saints Day ( <b>nL</b> )
November 9, 2023	Local bank holiday ( <b>nL</b> )
December 6, 2023	"Día de la Constitución" ( <b>nL</b> )
December 7, 2023	( <b>nL</b> )
December 8, 2023	Nationwide bank holiday ( <b>nL</b> )
December 23, 2023	Beginning of Christmas Holidays ( <b>nL</b> )
January 30, 2024	Beginning of lectures of the second semester
February 21, 2024	Activities at Caminos School ( <b>nL</b> )
March 25, 2024	Beginning of Easter Holidays ( <b>nL</b> )
April 2, 2024	End of Easter Holidays. Lectures resumed.
May 1, 2024	Workers' Day ( <b>nL</b> )
May 2, 2024	Region of Madrid Day ( <b>nL</b> )
May 10, 2024	St. Domingo de la Calzada, Patron Saint of School ( <b>nL</b> )
May 14, 2024	Tuesday with timetable of Wednesday
15 May 2024	Patron Saint of Madrid, (Sunday, <b>nL</b> )
24 May 2024	End of lectures

**CALENDARIO ESCOLAR**  
(2023-2024)

Para titulaciones de Grado y Máster Universitario de la Universidad Politécnica de Madrid  
Aprobado por el Consejo de Gobierno el 27 de abril de 2023

- PRIMER CUATRIMESTRE -

**Julio 2023**

L	M	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 2023**

L	M	M	J	V	S	D

**Noviembre 2023**

L	M	M	J	V	S	D
			1	2	3	4
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			

■ Docencia    ● Inicio    ■ Fin

**Septiembre 2023**

L	M	M	J	V	S	D
					1	2
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 2023**

L	M	M	J	V	S	D
					1	2
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 2023**

L	M	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 2024**

L	M	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	Jueves	Fiesta Nacional de España
01 NOV	Miércoles	Todos los Santos
09 NOV	Jueves	Nuestra Señora de la Almudena
06 DIC	Miércoles	Día de la Constitución
08 DIC	Viernes	La Inmaculada Concepción
25 DIC	Lunes	Natividad del Señor
01 ENE	Lunes	Año Nuevo
06 ENE	Sábado	Epifanía del Señor
26 ENE	Viernes	Santo Tomás de Aquino

Comienzo de las clases a partir del 4 de septiembre

**Febrero 2024**

L	M	M	J	V	S	D





**CALENDARIO ESCOLAR (2023-2024)**

Para titulaciones de Grado y Máster Universitario de la Universidad Politécnica de Madrid  
Aprobado por el Consejo de Gobierno el 27 de abril de 2023

- SEGUNDO CUATRIMESTRE -

**Enero 2024**

L	M	M	J	V	S	D
29	30	31				

**Febrero 2024**

L	M	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			

**Mayo 2024**

L	M	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	

**Marzo 2024**

L	M	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

**Abril 2024**

L	M	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					

**Junio 2024**

L	M	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

**Julio 2024**

L	M	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 2024**

L	M	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**

23 MAR	Sábado	Comienzo de vacaciones de Semana Santa
28 MAR	Jueves	Jueves Santo
29 MAR	Viernes	Viernes Santo
01 MAY	Miércoles	Día del Trabajo
02 MAY	Jueves	Fiesta de la Comunidad de Madrid
15 MAY	Miércoles	San Isidro Labrador
15 AGO	Jueves	La Asunción de Nuestra Señora

\* El estudiante podrá realizar ampliación restringida de matrícula únicamente para estudios oficiales con admisión en el segundo semestre, asignaturas con docencia duplicada (solo en el caso de que el estudiante haya cursado en el primer semestre y no la haya superado), TFG, TFM, Prácticas académicas externas curriculares y EPAC. Además se podrá ampliar hasta un máximo de 12 ECTS de asignaturas de segundo semestre.

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

■ Docencia    ● Inicio    ● Fin

www.upm.es



\* Tuesday 14<sup>th</sup> May: timetable of Wednesday

# Master Structure



## Structure

The Master's Degree in Materials Engineering is structured in **three** semesters of 30 ECTS credits each.

The **first** semester provides advanced general training in materials science and engineering, while in the **second** the student chooses between two specialties: Structural Materials and Functional Materials. In the **third** semester the students carry out the master's thesis.

Type of subject	ECTS credits
Compulsory	30
Elective	30
Master Thesis	30
<b>Total</b>	<b>90</b>



## Syllabus

### First semester (fall)

- C1. Microstructural Characterization (6 ECTS credits)
- C2. Properties of Materials (4.5 ECTS credits)
- C3. Advanced Manufacturing of Structural Materials (3 ECTS credits)
- C4. Advanced Manufacturing of Functional Materials (3 ECTS credits)
- C5. Modelling and Simulation in Materials Engineering (6 ECTS credits)
- C6. Materials for Energy (3 ECTS credits)
- C7. Biological Materials (4.5 ECTS credits)
- E2. Physics and Chemistry of Materials (3 ECTS credits, pre-requisit module)
- E3. Mechanics of Materials (3 ECTS credits, pre-requisit module)

### Second semester (spring)

#### Structural Materials (3 ECTS credits each)

- SE1. Structural Design
- SE2. Impact Mechanics
- SE3. Structural Integrity
- SE4. Forensic Engineering
- SE5. Alloy Design and Advanced Physical Metallurgy
- SE6. Nanocomposites and Nanostructured Hybrid Materials
- SE7. Materials for Extreme Conditions
- SE8. Polymers
- SE9. Introduction to Research in Materials Science and Engineering – Structural Materials

#### Functional Materials (3 ECTS credits each)

- FE1. Electrochemistry for Energy-related Applications
- FE2. Photovoltaic Materials and Devices
- FE3. Materials for Photonic Devices
- FE4. Nanoelectronics
- FE5. Solid-state Lighting
- FE6. Metamaterials and Plasmonics
- FE7. Future Magnetic Materials
- FE8. Laboratory of Nanoelectronics
- FE9. Introduction to Research in Materials Science and Engineering – Functional Materials



The syllabus is structured in three semesters of 30 ECTS each. The first semester provides advanced general training in materials science and engineering, while in the second the student chooses between two specialties: Structural Materials and Functional Materials. In the third semester the Final Master's Thesis (TFM) is carried out.

Depending on their bachelor's degree when enrolling the master's in Materials Engineering, the students can be required to take two additional subjects of 3 ECTS of pre-requisit modules during the first semester: "Physics and Chemistry of Materials" and "Mechanics of Materials". These subjects will be taught during the first 5 weeks of the semester, to guarantee that students quickly acquire the necessary knowledge for the properly follow the contents of the rest of the subjects. Typically, students from degrees such as physical sciences, chemical sciences, electrical or electronic engineering, etc. will take the "Mechanics of Materials" subject and students from degrees such as mechanical, aerospace, industrial engineering, etc. will take the subject "Physics and Chemistry of Materials". Those students will therefore take 33 ECTS credits in the first semester.

In the second semester, students will take the 27 ECTS credits corresponding to the chosen specialty, which include a 3 ECTS subject for introduction to research: "Introduction to Research in Materials Science and Engineering – Structural Materials" or "Introduction to Research in Materials Science and Engineering – Functional Materials". They will also take one of the subjects (3 ECTS) of the other specialty, which will allow them to complement their training, broaden their vision and improve their multidisciplinary according to their particular interest. However, students must take into account the courses timetable in order to make such decision.

In the third semester they will carry out the TFM, which will generally be a research, development and/or innovation project in structural or functional materials directed by one or more PhD professors/researchers.

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## TIMETABLE OF THE FIRST SEMESTER (Compulsory subjects) Classroom 05

The two pre-requisit module subjects (*644 Physics and Chemistry of Materials* and *645 Mechanics of Materials*) are taught intensively during the first 5 weeks of the semester. Subjects *605 Biological Materials* and *606 Materials for Energy* will start in week 6.

<b>1S</b> weeks 1-5		<b>FIRTS COURSE</b> First semester			<b>Classroom: 05</b>  2023-2024
	<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday</i>	<i>Friday</i>
9.00	<b>644</b> Physics and Chemistry of Materials / <b>645</b> Mechanics of Materials	<b>602.</b> Modelling and Simulation	<b>600.</b> Adv. Manufacturing Structural Mat.	<b>603.</b> Microstructural characterization	<b>603.</b> Microstructural characterization
10.00					
11.00	<b>601.</b> Adv. Manufacturing Functional Mat.	<b>644</b> Physics and Chemistry of Materials / <b>645</b> Mechanics of Materials	<b>604.</b> Properties of Materials	<b>644</b> Physics and Chemistry of Materials / <b>645</b> Mechanics of Materials	<b>602.</b> Modelling and Simulation
11.15					
12.00	<b>604.</b> Properties of Materials				
12.00					
13.00	<b>604.</b> Properties of Materials				
13.15					
13.30	<b>604.</b> Properties of Materials				
14.00					
15.00					





1S	weeks 6-15	FIRTS COURSE First semester	Classroom: 05  2023-2024
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	<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday</i>	<i>Friday</i>
9.00	<b>604.</b> Properties of Materials	<b>602.</b> Modelling and Simulation	<b>600.</b> Adv. Manufacturing Structural Mat.	<b>603.</b> Microstructural characterization	<b>603.</b> Microstructural characterization
10.00					
10.15	<b>601.</b> Adv. Manufacturing Functional Mat.	<b>605.</b> Biological Materials	<b>604.</b> Properties of Materials	<b>605.</b> Biological Materials	<b>602.</b> Modelling and Simulation
11.00					
11.15					
12.00	<b>605.</b> Biological Materials	<b>606.</b> Materials for Energy	<b>606.</b> Materials for Energy	<b>606.</b> Materials for Energy	<b>606.</b> Materials for Energy
12.15					
12.45	<b>605.</b> Biological Materials	<b>606.</b> Materials for Energy	<b>606.</b> Materials for Energy	<b>606.</b> Materials for Energy	<b>606.</b> Materials for Energy
13.00					
13.15	<b>605.</b> Biological Materials	<b>606.</b> Materials for Energy	<b>606.</b> Materials for Energy	<b>606.</b> Materials for Energy	<b>606.</b> Materials for Energy
14.00					
14.30	<b>605.</b> Biological Materials	<b>606.</b> Materials for Energy	<b>606.</b> Materials for Energy	<b>606.</b> Materials for Energy	<b>606.</b> Materials for Energy
15.00					

## TIMETABLE OF THE SECOND SEMESTER

### Functional Materials itinerary

### Classroom 09

The second semester will be distributed in two turns in which different subjects will be taught. The first turn will last from 30<sup>th</sup> January to 22<sup>nd</sup> March, while the second will last from 2<sup>nd</sup> April to 24<sup>th</sup> May.

2S		SECOND SEMESTER First turn <b>FUNCTIONAL MATERIALS</b>			Classroom: 09
JANUARY-MARCH					2023-2024
	Monday	Tuesday	Wednesday	Thursday	Friday
9.00	<b>618.</b> Materials for photonic devices	<b>619.</b> Nanoelectronics	<b>616.</b> Electrochemistry for Energy Related Applications	<b>619.</b> Nanoelectronics	
10.00					
11.00	BREAK				
11.30	<b>618.</b> Materials for photonic devices	<b>622.</b> Future Magnetic Materials	<b>616.</b> Electrochemistry for Energy Related Applications	<b>622.</b> Future Magnetic Materials	<b>617.</b> Photovoltaic materials and devices**
12.30					
13.30	BREAK				
15.00		<b>624.</b> Intro to Research in Mat. Science and Engineering: Functional Mat.**		<b>624.</b> Intro to Research in Mat. Science and Engineering: Functional Mat.**	
16.00					
17.00					



<b>2S</b>	<b>SECOND SEMESTER</b>	<b>Classroom: 09</b>
	APRIL-MAY	Second turn
	<b>FUNCTIONAL MATERIALS</b>	2023-2024

	<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday</i>	<i>Friday</i>
9.00	<b>620.</b> Solid-State Lighting	<b>623.</b> Laboratory of Nanoelectronics	<b>620.</b> Solid-State Lighting	<b>623.</b> Laboratory of Nanoelectronics	
10.00					
11.00					
11.30	BREAK				
12.30	<b>621.</b> Metamaterials and Plasmonics**	<b>621.</b> Metamaterials and Plasmonics**			<b>617.</b> Photovoltaic materials and devices**
13.30					

## Structural Materials itinerary Classroom 05

The second semester will be distributed in two turns in which different subjects will be taught. The first turn will last from 30<sup>th</sup> January to 22<sup>nd</sup> March, while the second will last from 2<sup>nd</sup> April to 24<sup>th</sup> May.

2S	<b>SECOND SEMESTER</b> First turn <b>STRUCTURAL MATERIALS</b>	<b>Classroom: 05</b>  2023-2024
JANUARY-MARCH		

	Monday	Tuesday	Wednesday	Thursday	Friday
9.00	<b>614.</b> Polymers	<b>610.</b> Forensic Engineering	<b>610.</b> Forensic Engineering	<b>614.</b> Polymers	<b>607.</b> Structural Design**
10.00					
11.00	BREAK				
11.30	<b>612.</b> Nanocompsites and Nanostructured Hybrid Materials	<b>612.</b> Nanocompsites and Nanostructured Hybrid Materials	<b>613.</b> Materials for Extreme Conditions	<b>613.</b> Materials for Extreme Conditions	
12.30					
13.30					



2S	APRIL-MAY	<b>SECOND SEMESTER</b> <b>Second turn</b> <b>STRUCTURAL MATERIALS</b>	<b>Classroom: 05</b>  2023-2024
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	<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>	<i>Thursday</i>	<i>Friday</i>
9.00	<b>615.</b> Intro to Research in Mat. Science and Engineering: Structural Mat.	<b>615.</b> Intro to Research in Mat. Science and Engineering: Structural Mat.	<b>611.</b> Alloy Design and Advanced Physical Metalurgy	<b>611.</b> Alloy Design and Advanced Physical Metalurgy	<b>607.</b> Structural Design**
10.00					
11.00	BREAK				
11.30			<b>608.</b> Impact Mechanics**	<b>608.</b> Impact Mechanics**	
12.30					
13.30	BREAK				
15.00			<b>609.</b> Structural Integrity**	<b>609.</b> Structural Integrity**	
16.00					
17.00					

## Calendar of exams

<b>Regular exams. First Semester</b>				
<b>Code</b>	<b>Subject</b>	<b>Date</b>	<b>Time</b>	<b>Room</b>
43000644	PHYSICS AND CHEMISTRY OF MATERIALS	8 January 2024	9:00	
43000645	MECHANICS OF MATERIALS	8 January 2024	9:00	
43000604	PROPERTIES OF MATERIALS	9 January 2024	9:00	
43000600	ADVANCED MANUFACTURING OF STRUCTURAL MAT.	11 January 2024	9:00	
43000601	ADVANCED MANUFACTURING OF FUNCTIONAL MAT.	15 January 2024	9:00	
43000602	MODELLING AND SIMULATION IN MATERIALS SCIENCE AND ENGINEERING	17 January 2024	9:00	
43000603	MICROSTRUCTURAL CHARACTERIZATION	19 January 2024	9:00	
43000605	BIOLOGICAL MATERIALS	22 January 2024	9:00	
43000606	MATERIALS FOR ENERGY	25 January 2024	9:00	

<b>Regular exams. Second Semester</b>				
<b>Code</b>	<b>Subject</b>	<b>Date</b>	<b>Time</b>	<b>Room</b>
43000615	INTRODUCTION TO RESEARCH IN MATERIALS SCIENCE AND ENGINEERING - STRUCTURAL MAT.	30 May 2024	9:00	
43000614	POLYMERS	31 May 2024	9:00	
43000609	STRUCTURAL INTEGRITY	3 June 2024	9:00	
43000610	FORENSIC ENGINEERING	5 June 2024	9:00	
43000613	MATERIALS FOR EXTREME CONDITIONS	7 June 2024	9:00	
43000612	NANOCOMPOSITES AND NANOSTRUCTURED HYBRID MAT.	10 June 2024	9:00	
43000608	IMPACT MECHANICS	11 June 2024	9:00	
43000607	STRUCTURAL DESIGN	13 June 2024	9:00	
43000611	ALLOY DESIGN AND ADVANCED PHYSICAL METALLURGY	14 June 2024	9:00	
43000624	INTRODUCTION TO RESEARCH IN MATERIALS SCIENCE AND ENGINEERING - FUNCTIONAL MAT.	30 May 2024	12:00	
43000616	ELECTROCHEMISTRY FOR ENERGY-RELATED APPLICATIONS	31 May 2024	12:00	
43000617	PHOTOVOLTAIC MATERIALS AND DEVICES	3 June 2024	12:00	
43000618	MATERIALS FOR PHOTONIC DEVICES	5 June 2024	12:00	
43000619	NANOELECTRONICS	7 June 2024	12:00	
43000620	SOLID STATE LIGHTING	10 June 2024	12:00	
43000621	METAMATERIALS AND PLASMONICS	11 June 2024	12:00	
43000622	FUTURE MAGNETIC MATERIALS	13 June 2024	12:00	
43000623	LABORATORY OF NANOELECTONICS	14 June 2024	12:00	

**Second-opportunity exams  
Compulsory subjects**

<b>Code</b>	<b>Subject</b>	<b>Date</b>	<b>Time</b>	<b>Room</b>
43000644	PHYSICS AND CHEMISTRY OF MATERIALS	25 June 2024	9:00	
43000645	MECHANICS OF MATERIALS	25 June 2024	9:00	
43000600	ADVANCED MANUFACTURING OF STRUCTURAL MAT.	28 June 2024	9:00	
43000601	ADVANCED MANUFACTURING OF FUNCTIONAL MAT.	1 July 2024	9:00	
43000602	MODELLING AND SIMULATION IN MATERIALS SCIENCE AND ENGINEERING	3 July 2024	9:00	
43000603	MICROSTRUCTURAL CHARACTERIZATION	5 July 2024	9:00	
43000605	BIOLOGICAL MATERIALS	8 July 2024	9:00	
43000606	MATERIALS FOR ENERGY	10 July 2024	9:00	
43000644	PHYSICS AND CHEMISTRY OF MATERIALS	12 July 2024	9:00	

**Second-opportunity exams.  
Elective subjects**

<b>Code</b>	<b>Subject</b>	<b>Date</b>	<b>Time</b>	<b>Room</b>
43000615	INTRODUCTION TO RESEARCH IN MATERIALS SCIENCE AND ENGINEERING - STRUCTURAL MAT.	24 June 2024	12:00	
43000614	POLYMERS	26 June 2024	12:00	
43000609	STRUCTURAL INTEGRITY	27 June 2024	12:00	
43000610	FORENSIC ENGINEERING	2 June 2024	12:00	
43000613	MATERIALS FOR EXTREME CONDITIONS	4 June 2024	12:00	
43000612	NANOCOMPOSITES AND NANOSTRUCTURED HYBRID MAT.	5 June 2024	12:00	
43000613	IMPACT MECHANICS	9 July 2024	12:00	
43000614	STRUCTURAL DESIGN	11 July 2024	12:00	
43000611	ALLOY DESIGN AND ADVANCED PHYSICAL METALLURGY	12 July 2024	12:00	
43000624	INTRODUCTION TO RESEARCH IN MATERIALS SCIENCE AND ENGINEERING - FUNCTIONAL MAT.	24 June 2024	9:00	
43000616	ELECTROCHEMISTRY FOR ENERGY-RELATED APPLICATIONS	26 June 2024	9:00	
43000617	PHOTOVOLTAIC MATERIALS AND DEVICES	27 June 2024	9:00	
43000618	MATERIALS FOR PHOTONIC DEVICES	2 June 2024	9:00	
43000619	NANOELECTRONICS	4 June 2024	9:00	
43000620	SOLID STATE LIGHTING	5 June 2024	9:00	
43000621	METAMATERIALS AND PLASMONICS	9 July 2024	9:00	
43000622	FUTURE MAGNETIC MATERIALS	11 July 2024	9:00	
43000623	LABORATORY OF NANOELECTONICS	12 July 2024	9:00	

## Information about subjects

There is a learning guide for each subject, which can be consulted on the GAUSS platform of the University and in Moodle, accessible through the Virtual Polytechnic.

You can also find the guides in the following link:

<https://drive.upm.es/s/kFvfqgMN2kxNHvj>

Password: masterMat23-24

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