

## TIMETABLE for the Master ERASMUS MUNDUS in NUCLEAR PHYSICS in Spain

### Academic year 2023-2024

The students have to follow the following topics in the first semester, all of them in Seville (except Nuclear Structure):

**Quantum Mechanics** (60 hours)

**Atomic and Plasma Physics** (60 hours)

**Basic Experimental Nuclear Physics** (45 hours = 30 h theory + 15 h lab (5 experiments x 3 h/exp))

**Computing and Numerics** (45 hours)

**Nuclear Structure** (30 h intensive during two weeks January 08-12, (on-line) and January 15-19 (in person), 2024) in Madrid  
(Trip to Caen January 21-24 January)

There will be an intensive Spanish course for beginners from October 2-20 in the mornings.

Students from paths 1 and 3 are expected to be in Sevilla until February 24th.

During last week of February students in path 1 (Experiments) and path 3 (Applications) have to move to Padova and Catania, respectively. They are expected to be there by March 1st, 2023.

Second semester (for the **theory path-2**)

**Introduction to Nuclear Reactions** (30 h intensive during two weeks February 5-16, 2024) in Sevilla

**Relativistic Quantum Theory: Nuclear Processes** (30 h intensive during the weeks February 26-March 1 (on-line) & March 4-8 (in person), 2024) in Sevilla

**Many-Body Theories in Nuclear Physics** (30 h intensive during the weeks March 11-15 (on-line) & March 18-22 (in person), 2024) in Madrid

**Elective, one of the following**

- **Hadron Physics** (30 h intensive during the weeks April 8-12 (on-line) & April 15-19 (in person), 2024) in Barcelona
- **Nuclear Astrophysics** (30 h intensive during the weeks April 15-19 (on-line) & 22-26 (in person), 2024) in Barcelona

**Weak Interactions** (30 h intensive during the weeks May 6-10 (on line) & May 13-17 (in-person), 2024) in Sevilla

Acronyms:

**QM = Quantum Mechanics**

**A&P = Atomic and Plasma Physics**

**BENP = Basic Experimental Nuclear Physics**

**C&N = Computing and Numerics**

**NS = Nuclear Structure: properties and models**

**MBT = Many-Body theories in Nuclear Physics**

**RQT = Relativistic Quantum Theory: Nuclear Processes**

**WI = Weak Interactions**

**HP= Hadron Physics\***

**NA = Nuclear Astrophysics\***

**NR = Nuclear Reactions**

**\*Each student has to choose one of these subjects**

**WEEKS**

<b>40:</b> October 2-6	<b>41:</b> October 9-13	<b>42:</b> October 16-20	<b>43:</b> October 23-27
<b>44:</b> Oct.30-Nov. 3	<b>45:</b> November 6-10	<b>46:</b> November 13-17	<b>47:</b> November 20-24
<b>48:</b> Nov 27-Dec 1	<b>49:</b> December 4-8	<b>50:</b> December 11-15	<b>51:</b> December 18-22

10:00-13:00	BENP laboratory GROUP 1	BENP laboratory GROUP 2	BENP laboratory GROUP 3	BENP laboratory GROUP 4	
Weeks 41, 42, 43, 44, and 45					

15:00-17:00	A&P	QM	A&P	QM	QM
17:30-19:00	C&N	BENP (theory)	BENP (theory)	A&P	C&N
19:00-19:30	C&N			A&P	C&N
19:30-20:00	C&N				C&N
Weeks 40-48 & 50-51					

### **QM and A&P (60 hours)**

**Starting date: October 2, 2023 (Week number 40) -**

**Ending date: December 22, 2023 (week: 51) (6 hours/week)**

**Final Exams:**

- QM: January 29<sup>th</sup>
- A&P: February 2<sup>nd</sup>

### **BENP (45 hours)**

**Starting date:**

**THEORY (30 hours): October 2, 2023 (week number 40) -**

**Ending date: December 22, 2023 (week: 51) (3 hours/week)**

LAB Group 1 (15 hours): weeks 41-45, **(normally) on Monday**

LAB Group 2 (15 hours): weeks 41-45, **on Tuesday**

LAB Group 3 (15 hours): weeks 41-45, **on Wednesday**

LAB Group 4 (15 hours): weeks 41-45, **on Thursday**

**Exam:**

Final Exam: January 31<sup>st</sup>

### **C&N (45 hours)**

**Starting date:**

**THEORY (45 hours): October 2, 2023 (week number 40) -**

**Ending date: December 22, 2023 (week: 51) (4,5 hours/week)**

**Evaluation (presentation of projects): January 8-12**

### **NS**

**Teaching period:** weeks 2-3, January 8-12 (on-line) + January 15-19 (in person), 2024 in MADRID

**Exam:** January 26, 2024 in Sevilla

**Week 4: January 22-24, 2024 visit to CAEN (France)**

### **SECOND SEMESTER**

#### **NR**

**Teaching period:** weeks 6-7, February 5-16 (in person) 2024 in SEVILLA

**Exam:** February 23, 2024.

#### **RQT**

**Teaching period:** weeks 9-10, February 26- March 1 (on-line) & March 4-8 (in person) 2024 in SEVILLA

**Exam:** April 2, 2024

#### **MBT**

**Teaching period:** weeks 11-12, March 11-15 (in person) & March 18-22 (on-line) 2024 in MADRID

**Exam:** April 5, 2024

**HP\***

**Teaching period:** weeks 15-16, April 8-12 2024 (on-line) & April 15-19 2024 (in person) in BARCELONA  
Exam: April 29, 2024

**NA\***

**Teaching period:** weeks 16-17, April 15-19, 2023 (on-line) & April 22-26, 2023 (in-person) in BARCELONA  
Exam: May 3, 2024

\* each student has to select one of these topics

**WI**

**Teaching period:** weeks 19-20, May 6-10 (on-line) 2024 & May 13-17 (in-person) 2024, in SEVILLA  
Exam: May 24, 2024

Subject	ECTS	Place	Dates	Character	EXAMS
Nuclear Structure: Properties and Models	6	Madrid	8-12 January 2023 (on-line) 15-19 Jan 2024 (in person)	Compulsory	26 January 2024
Introduction to Nuclear Reactions	6	Sevilla	5-16 February (in person) 2024	Compulsory for path2 students	23 February 2024
Relativistic Quantum Mechanics: Nuclear Processes**	6	Sevilla	26 Feb- 1 March 2023 (on-line) 4-8 March 2024 (in person)	Compulsory for path2 students	2 April 2024
Many-Body Theories in Nuclear Physics**	6	Madrid	11-15 March 2024 (in person) 18-22 March 2024 (on.line)	Compulsory for path2 students	5 April 2024
Hadron Physics**	6	Barcelona	8-12 April 2024 (on-line) 15-19 April 2024 (in-person)	Elective for path2 students	29 April 2024
Nuclear Astrophysics**	6	Barcelona	15-19 April 2024 (on-line) 22-26 April 2024 (in person)	Elective for path2 students	3 May 2024
Weak Interactions **	6	Sevilla	6-10 May 2024 (on-line) 13-17 May 2024 (in person)	Compulsory for path2 students	24 May 2024

**In case of fail in one or more subjects, the student will have one extra opportunity in the period June 10 to July 17.**

**In addition, extra curriculum activities will be programmed in June and July, 2024.**

**For S3, the lectures at Caen (France) start in September 1<sup>st</sup>, 2023.**

End of evaluation for subjects in S1: February 24

End of evaluation for subjects in S2: June 9

**End first call for subjects in S1 & S2: June 16**

Second call: period for exams for who failed in subjects in S1 and/or S2: June 10 to July 17.

S1 subjects: June 10 to June 21.

S2 subjects: July 8 to July 17.

**End second call for subjects in S1 & S2: July 17**