Polytechnic University of Madrid

Higher Technical School of Naval Architects & Marine Engineers

INTERNATIONAL MASTER'S DEGREE

IN MILITARY NAVAL ENGINEERING

V EDITION (online version) – 2026

Summary Description

RATIONALE AND OBJECTIVES

The Armed Forces of many countries have officers with adequate training for their own operational needs, including military and technical aspects. The normal time limitation of training periods means that the emphasis of their curricula is on the military aspect, since this is its unavoidable function, while the technical aspect can be complemented by support external to the military organization.

However, it is common for some Navies to consider it convenient to complement the technical training of some of their officers, after their graduation, in their own schools, if they have them , or in university or specialized centers with training programs of their interest.

In an increasingly complex technology environment with ever-tightening budgets, Marinas need officers with the necessary training to manage complex systems procurement projects: evaluating bids, carrying out preliminary projects, evaluating costs, supervising quality during construction , etc. Plan unit support and maintenance throughout lifecycle and infrastructure needs. This Master's Degree will provide students with skills that will allow them to have their own independent criteria in the different naval technological areas with regard to their internal activity and their relationships with industry professionals.

For many years, the Spanish Navy has trained the officers of its Corps of Engineers at the Higher Technical School of Naval Engineers of the Polytechnic University of Madrid (ETSIN), heir to the Academy of Engineers of the Navy, for the prestige and excellence it has achieved throughout its existence, having been the initial driving forcé of the high level and recognition enjoyed by both Spanish naval technology and its professionals.

The completion of the Master's Degree makes available to its students, in addition to the academic level of the ETSIN, the great experience in naval programs of the Spanish Navy and the Defense Industry. These values are key when it comes to reinforcing mutual knowledge, improving the scientific and technical training of the participants, and promoting the knowledge of the national industry, in turn providing opportunities to help the development of the countries involved.

This Master's Degree is designed for the postgraduate training of military naval officers with operational technical knowledge who wish to increase or acquire the basic concepts and techniques that engineers handle in the activities of designing, building, maintaining and repairing warships.

It is, therefore, a matter of offering complementary training at an appropriate level that facilitates the subsequent performance of naval program management functions in the military field: from the definition of ship requirements, evaluation of bids, inspection of works and reception of units , to the planning of logistical support throughout the training cycle life.

This training versatility and the excellence of the teaching staff make the Master's Degree an ideal instrument for specialized personnel (university graduates) from companies or organizations closely linked to the Ministries of Defense for their participation in Military Shipbuilding Programs, in order to adequately acquire skills and professional development in this field.

The Master's Degree aims to provide coherent technical and managerial training to Navy officers and engineers linked to the Naval Defence Programmes of the countries concerned in order to facilitate the exercise of management functions of the aforementioned Naval Programmes, ship acquisition and fleet maintenance.

Another of the main objectives of the Master's Degree is to offer students the possibility of knowing in depth the main characteristics of the Military Naval Industry.

Attendance at this immersive course also facilitates personal contact and the exchange of knowledge and criteria between officers from the Navy and very different countries in a conducive environment and in an educational framework of the highest prestige.

AIMED AT:

• Officers of the allied and friendly navies

• Qualified personnel linked to the Naval Programs of the Ministries of Defense of allied and friendly countries

PROGRAM

The Master's Degree in Military Naval Engineering is a degree of the Higher Technical School of Naval Architects & Marine Engineers of the Polytechnic University of Madrid, defined as a lifelong learning activity. It has a teaching load of 90 ECTS credits, divided into 3 modules or blocks with 23 subjects plus a Master's Thesis.

The content of the courses has been carefully designed, after a complete evaluation of the training needs carried out in a first fit with the Navy and NAVANTIA, and in a subsequent adjustment with the main companies working in the field of Defence, a highly complex industrial sector that demands engineers with multidisciplinary training and access to sophisticated technologies with high added value.

The sessions will take place at the ETSIN from Monday to Friday in the afternoon, from 15 pm to 20:30 pm.

Module 1 – 5 subjects

- Principles of Shipbuilding and Design. Life Cycle.
- Warship Project.
- Systems Engineering.
- Principles of Naval Architecture.
- Auxiliary systems.

Module 2 – 8 subjects

- Naval Force: Strategy and Planning.
- Management and development of a Shipbuilding program of Warships.
- Warships.
- Propulsion systems and selection methodologies.
- Accomodation and comfort on board.
- Electrical Engineering and Electrical Systems.
- Vessel Dynamics.
- Shipbuilding I

Module 3 – 11 subjects

- On-board electronics.
- Structural dynamics and vibrations.
- Combat Systems.
- Integrated Logistics Support.
- Naval equipment.
- Shipbuilding II
- New Technologies and R+D.
- On-board unmanned systems.
- Shipyard administration and construction cost control.
- Ship repairs and maintenance.
- Master's Thesis

The content of the Master's Thesis will deal with some of the scientific-technical fields related to the Master's Degree and will involve feedback and practical application of a large part of the content learned in it. The average workload is equivalent to about 125 - 150 hours, and can be developed in collaboration with institutions, companies, Research Centers and national and international organizations.

It will be evaluated through the preparation of a Project supervised by an academic tutor and its oral presentation before the panel appointed by the Academic Committee.

The typology of this work will be adapted to the achievement of the following learning objectives:

a) Demonstrate knowledge and selective use of content studied in the Master's Degree in an integrative, creative and synthesis work.
b) Prepare Reports in the field of Naval Military Engineering.

Regarding the competencies that are intended to be achieved for students with the development of the Master's Thesis, the following are cited:

- Ability to abstract models, solutions, and problem solving.
- Practical skills in professional development in different areas of Naval Military Engineering.
- Ability to analyse and synthesize complex situations.
- Application of the knowledge, skills, abilities and competencies acquired in the Master's Degree in a real, and preferably business, context.
- Ability to be involved in activities related to research and/or technological innovation.

LANGUAGE

The Master's Degree will be taught in this Edition in English.

All course documentation will be delivered both in Spanish and in English.

COORDINATION OF THE SUBJECTS

Each subject is coordinated by a professor either from the Navy, or from Navantia or from the ETSIN-UPM. And each subject coordinator has a team of professors and professionals selected from the following collaborating companies and scientific advisors to cover the contents:

STAFF AND SCIENTIFIC ADVICE		
Armada	GHENOVA	Schottel
Navantia	OESIA	MAN
Indra	SAES	DNV
SIEMENS	ABB	Caterpillar
Isdefe	Centro Tecnológico SOERMAR	Centro Superior de Estudios de la Defensa Nacional (CESEDEN)
Seaplace	Fernández Jove	
Bureau Veritas	Frizonia	Grupo ARMON
Lloyd's	SIPORT21	Aeromarine

QUALIFICATION

Students who take the Master's Degree described in this document obtain the Title of **"International Master's Degree in Military Naval Engineering (online course of 90 ECTS credits)"** awarded by the Higher Technical School of Naval Architects & Marine Engineers (ETSIN) of the Polytechnic University of Madrid (UPM).

INNOVATIVE CONTENT

Modules 2 and 3 of the Program incorporate training in innovative content explained by the experts directly involved in its management and development, of the utmost interest and relevance in Military Naval Engineering, such as:

1. Digital Ship / Digital Twin
2. MSBE Model Based System Engineering
3. Fuel Cells – AIP Utilization – Submarine S80
4. Frigate F110 Program
5. Submarine Certification
6. Integrated Logistics Support to Naval Programs
7. New Safety Requirements in Military Shipbuilding
8. Decarbonization Roadmap in Military Shipbuilding
9. Integration of unmanned vehicles into command and control systems

TEACHING STAFF

The teaching staff (Annex I) is made up of a group of Professors and Tenured Professors of the School of Naval Engineers of the Polytechnic University of Madrid (ETSIN) as well as a group of professionals with a high level of knowledge and experience in the Navy and in the most relevant companies in the Defence sector, such as Navantia, Indra, SAES, Ghenova, ABB, Seaplace, Grupo Oesía, Bureau Veritas, DNV, Lloyd's, Siemens, Isdefe, CT Engineering, Centro Tecnológico SOERMAR, Centro de Experiencias Hidrodinámicas de El Pardo, Schottel, SIPORT21, MAN, Caterpillar, Frizonia and Fernández Jove.

International participation in training has also been strengthened with teachers who teach at German and Dutch universities.

PARTICIPATION OF THE NATIONAL DEFENSE INDUSTRY

The support of the Classification Societies and companies in the Defence Sector to the Master's Degree is very important and significant, and is implemented and channelled through:

1. Advice to the organization of the Master's Degree on the Teaching Program and on the innovative contents to be incorporated in each edition
2. Provision of teachers from their own companies
3. Offer for training visits to their headquarters and work centers
4. Scholarships to study the Master's Degree for officers of the allied navies and friends
5. Scholarships to study the Master's Degree for its own professionals

CALENDAR

The Master's Degree has a duration of **9 academic months** and a total of 11 months of calendar including 2 months of holidays with 3 significant periods:

1. From January 8th to July 8th (**6 months**) ONLINE classes. This period constitutes the **core** of the Master, with classes coinciding with the face-to-face classes of the Master's Degree in face-to-face format.
2. From September 7th to October 20th (**1 ½ months**) ONLINE classes, for both formats of the Master (face-to-face and ONLINE) mainly dedicated to review contents ot the 3 Modules and some complementary lectures.
3. From October 21 to November 20 they are dedicated remotely to continue the preparation and defense of the Master's Thesis.

Master's Calendar in Military Naval Engineering - VI EDICION - 2026

Start	Thursday 8 January	End classes	Tuesday 20 October
TFM online start	Monday 25 May	Master's & TFM end	Friday 20 November

Leyenda	
Module 1:	
Module 2:	
Module 3:	
internships	
M1, M2, M3 review	
Máster Thesis	
No school	

January 26

M	T	W	T	F	S	S
			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	

February 26

M	T	W	T	F	S	S
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16	17	18	19	20	21	22
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Mars 26

M	T	W	T	F	S	S
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9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	25	27	28	29
30	31					

April 26

M	T	W	T	F	S	S
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13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

May 26

M	T	W	T	F	S	S
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18	19	20	21	22	23	24
25	26	27	28	29	30	31

June 26

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July 26

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13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

August 26

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September 26

M	T	W	T	F	S	S
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14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

October 26

M	T	W	T	F	S	S
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12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

November 26

M	T	W	T	F	S	S
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9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	25	27	28	29
30						

ORGANIZATION

Master`s DIRECTION

Director

Antonio Crucelaegui Corvinos
Director of the Higher Technical School of Naval Architects & Marine Engineers – Polytechnic University Madrid

Coordinator

CN Ing. Concepción Rodrigo Bayo
Director of the Higher Technical School of Naval Weapons Engineers – (Spanish Navy)

Secretary

David Díaz Gutiérrez
Deputy Director Head of Studies - Higher Technical School of Naval Architects & Marine Engineers - UPM

MONITORING COMMITTEE

- Admiral Director of Naval Education - DIENA
- Director of the Higher Technical School of Naval Engineers
- Director of the Higher Technical School of Naval Weapons Engineers
- Deputy Director of Studies at ETSIN

METHODOLOGY

1. Theoretical sessions: ONLINE classes on the subjects of the program. They are served through the Webex online platform (alternatively Teams, Zoom platforms). The online conferences scheduled will be broadcast on one of the available platforms (Webex, Teams, Zoom) and **taped** for the subsequent use of the students.

2. Practical sessions: Assignments for written submission or oral presentation on specific aspects of the program. Seminars. Tasks to be carried out through the Moodle educational platform of the Polytechnic University of Madrid. Moodle is a learning platform designed and tuned to provide educators, administrators and students with a single, robust and secure integrated system to create personalised learning environments.

3. Self-study: reading, preparation of written work and oral presentations, and assignments in Moodle.

4. Tests: in hydrodynamic testing facilities of the ETSIN (CEHINAV) and the El Pardo Experimentation Towing Tank Center (INTA-CEHIPAR). NOT included in the ONLINE format of the Master

5. Internships in Navy facilities and others: visits (to be confirmed) to the Navy Submarine School and the Cartagena Arsenal, Ferrol Arsenal, Navantia Training Center in San Fernando, CESENA in Ferrol, among others. NOT included in the ONLINE format of the Master

EVALUATION

The Modules will be assessed through a combination of continuous assessment (proposed assignments) and exams.

Each module is graded according to its weight in ECTS in the Master's Degree. The minimum grade in each module must be 3 out of 10.

ACCESS TO THE MASTER'S DEGREE

Requirements. To access this Master's Degree, the following conditions are required:

1. Be a career officer of a Navy accredited by it before the Spanish Navy or have the title of Naval Engineer, Mechanical Engineer or other related engineering accredited by the University that has granted the degree.

2. Have a sufficient level of English to follow the Master's Degree with advantage.

3. Pay the established enrolment fees

4. Accept the internal operating rules of the UPM.

PROCEDURE FOR ADMISSION TO THE MASTER'S DEGREE:

Phase 1: Application for admission addressed to the Master's Secretary's Office.

1. The application for admission with the candidate's details will be sent to the email address master.inm.navales@upm.es

2. The application shall be accompanied by:

- Copy of passport
- Copy of university degree
- Copy of the transcript or certificate of studies with the breakdown of subjects taken, year and grades.
- Professional Curriculum

3. The application will be evaluated by the Master's Academic Committee. If approved, the candidate will be sent a certificate of admission by the master's degree management in order to process a study visa, health policy or any other necessary procedure.

Phase 2: Pre-enrolment at the UPM.

4. Admitted candidates must make their official pre-registration in the UPM's Athenea system (a computer program that must be accessed in person), where they will have to provide the same legalized/apostilled documentation in the case of the degree and certificate of studies and with the visa in the case of the passport.

Phase 3: Enrolment:

5. The enrolment of pre-registered candidates will be carried out by the Master's Secretary's Office.
6. In the event that the master's degree is paid for by any institution, Navy or Ministry of Defence, an invoice may be issued in advance so that the registration fees can be paid by the entity.
- In the event that it is paid for personally by the candidate, an amount will be requested for the reservation of a place until the issuance of the Letter of Payment of the Enrolment, once the procedure has been formalised.

TUITION FEES:

The total cost of the Master's fees for this online version is €20,000, which can be paid in a single payment or in two instalments of €10,000 with a deadline of 30 Mars 2026 for the second payment. The amount given as a place reservation, if applicable, will be deducted from this amount.

SCHOLARSHIP PROGRAM

During the months of December 25 and January 26, it is expected that the different calls for scholarships and grants to study the Master's Degree and grants for the completion of Master's Thesis will be launched, sponsored by the different collaborating companies and by the Marqués de Suanzes Foundation, and providing the International Master's Program in Military Naval Engineering with extensive funding support.

Contact:

Master's Office: master.inm.navales@upm.es

Other: relaciones.institucionales.navales@upm.es Tfno: +34 910 676 108

director.navales@upm.es Tfno: +34 910 676 102

A N N E X I

MASTER'S STAFF		
Teacher	**Title**	**Company**
ALEJANDRO ZORZO	Naval Architect &ME	ABB
DP-EMA TEAM		
Miguel Ramón Cuartero Lorenzo	CN Navy General Staff	ARMADA
Álvaro Zaragoza Ruiz	CF Navy General Staff	ARMADA
Alfonso Carrasco Santos	CF Navy General Staff	ARMADA
Juan Miguel Evangelista Pintado	CF Navy General Staff	ARMADA
Juan Manuel de Santiago Collada	CF Navy General Staff	ARMADA
José Manuel de Mata Hervás	CF Navy General Staff	ARMADA
Emilio Regodón	CN Navy General Staff	ARMADA
Gabriel Pita de Veiga	CF Navy General Staff	ARMADA
Jose Ramon Boado	CN Navy General Staff	ARMADA
MANUEL ANTONIO MARTÍNEZ RUIZ	VA (R) PhD Telecommunication eng.	ARMADA
FRANCISCO PEREZ VILLALONGA	CN PhD Naval Architect &ME	ARMADA
LUIS PINTOS SANTIAGO	CN Ing (R)	ARMADA
ARTURO PIÑEIRO	CF Naval Architect &ME	ARMADA
FRANCISCO JAVIER DEL CORRAL	CN Naval Architect &ME	ARMADA
MONTSERRAT ESPÍN GARCÍA	PhD Naval Architect &ME	BUREAU VERITAS
JAIME PANCORBO	PhD Naval Architect &ME	BUREAU VERITAS
ALEJANDRO BENITO	PhD Naval Architect &ME	CATERPILLAR
CHRISTIAN VON OLDERSHAUSEN	PhD Naval Architect &ME (Germany)	DNV
MARIAN GALVEZ	Naval Architect &ME	DNV
ANTONIO CRUCELAEGUI	PhD Naval Architect &ME - DEAN ETSIN	ETSIN
JULIO GARCIA ESPINOSA	Full professor	ETSIN
JOSE ANDRES SOMOLINOS	Full professor	ETSIN
ANTONIO SOUTO	Full professor	ETSIN
TERESA LEO	Full professor	ETSIN
JOSE ANTONIO RODRIGUEZ FLORES	CN Ing (R)	FRIZONIA
RAFAEL CALDERON	Naval Architect &ME	GHENOVA
OLIVER MARTINEZ VITORIANO	Ing. Industrial Eng.	GHENOVA
JORGE ENRIQUE CARREÑO	VA PhD Naval Architect &ME	GHENOVA Colombia
JOSE MARIA MOREU GAMAZO	PhD Naval Architect &ME	HI IBERIA
JUAN ALBERTO VECINO	Naval Architect &ME	HI IBERIA
ANA BUENDIA	IIndustrial Eng.	INDRA
JORGE GARCIA	Industrial Eng.	INDRA
ISABEL GONZALEZ HERVAS	Telecomunication Eng.	INDRA
PELAYO ALVAREDO	IT Engineer	INDRA

MASTER'S STAFF		
Docente	**Titulación**	**Empresa**
BLANCA GARAT GONZALEZ	IT Engineer	INDRA
LUIS GARCIA DE LA IGLESIA	Telecomunication Eng.	INDRA
ISABEL BRUÑA	Telecomunication Eng.	INDRA
FULGENCIO CASANOVA	PhD Naval Architect &ME	ISDEFE
ALBERTO DOMINGUEZ	PhD Naval Architect &ME	ISDEFE
FERNANDO JIMÉNEZ	Industrial Eng.	ISDEFE
DAVID GÓMEZ GÓMEZ	Naval Architect &ME	ISDEFE
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JUAN DE ARANA	PhD Naval Architect &ME	LLOYD'S
PATRICIA TRIGO SEGOVIA	Naval Architect &ME	LLOYD'S
MANUEL SANCHEZ MACIAS	Naval Architect &ME	LLOYD'S
FERNANDO MARCOS	Naval Architect &ME	MAN
MIGUEL ÁNGEL MARIN FUENTES	Naval Architect &ME	NAVANTIA
JAVIER LÓPEZ SAN ROMÁN	Naval Architect &ME	NAVANTIA
ÁNGEL CÁRCELES ALONSO	PhD Naval Architect &ME	NAVANTIA
JUAN CARLOS DÍAZ CUADRA	Naval Architect &ME	NAVANTIA
FRANCISCO VIEJO DE FRANCISCO	Naval Architect &ME	NAVANTIA
SERGIO LÁZARO REY	Naval Architect &ME	NAVANTIA
GEMA BLANCO MONTES	Industrial Ing.	NAVANTIA
JUAN CARLOS DÍAZ CUADRA	Naval Architect &ME	NAVANTIA
FRANCISCO MONTILLA DE MORA	Naval Architect &ME	NAVANTIA
LUIS LUENGO	PhD Naval Architect &ME	NAVANTIA
DAVID ZAPLANA	Telecomunication Ing.	SAES
ELENA MOREDA	Graduate in Physics	SAES
JASPER GREVINK	Phd Mechanical Engineer DELFT (Holanda)	SCHOTTEL
ALFONSO LÓPEZ DE ASIAÍN ZABÍA	PhD Naval Architect &ME	SEAPLACE
JUAN MANUEL DE LA CRUZ	PhD Naval Architect &ME	SEAPLACE
ADRIAN SARO BLASCO	Naval Architect &ME	SEAPLACE
RODRIGO PÉREZ FERNÁNDEZ	PhD Naval Architect &ME	SIEMENS
JAVIER FERNANDEZ	Industrial Ing.	SIEMENS
CESENA TEAM		SIEMENS
EVA NOVOA ROJAS	PhD Naval Architect &ME	SOERMAR