ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

83000008 - Offshore Platform Dynamics

DEGREE PROGRAMME

08IN - Master Universitario En Ingenieria Naval Y Oceanica

ACADEMIC YEAR & SEMESTER

2024/25 - Semester 2

Index

Learning guide

1. Description

1.1. Subject details

Name of the subject	83000008 - Offshore Platform Dynamics
No of credits	4.5 ECTS
Type	Compulsory
Academic year ot the programme	First year
Semester of tuition	Semester 2
Tuition period	February-June
Tuition languages	English
Degree programme	08IN - Master Universitario en Ingenieria Naval y Oceanica
Centre	08 - Escuela Tecnica Superior De Ingenieros Navales
Academic year	2024-25

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Antonio Souto Iglesias (Subject coordinator)		antonio.souto@upm.es	- -
Antonio Medina Manuel		antonio.medina.manuel@upm.es	Sin horario.

* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

3. Skills and learning outcomes *

3.1. Skills to be learned

(K4) - Conocimiento de los elementos de oceanografía física (olas, corrientes, mareas, etc.) necesarios para el análisis del comportamiento de las estructuras oceánicas, y de los elementos de las oceanografías química y biológica que deben ser tenidos en cuenta para la seguridad marítima y para el tratamiento de la contaminación, y del impacto ambiental producido por los buques y artefactos marinos.

(K5) - Conocimiento de los sistemas de posicionamiento y de la dinámica de plataformas y artefactos.

CG1 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio.

CG2 - Que los estudiantes sean capaces de integrar conocimientos y enfrentarse a la complejidad de formular juicios a partir de una información que, siendo incompleta o limitada, incluya reflexiones sobre las responsabilidades sociales y éticas vinculadas a la aplicación de sus conocimientos y juicios.

CG3 - Que los estudiantes sepan comunicar sus conclusiones- y los conocimientos y razones últimas que las sustentan a públicos especializados y no especializados de un modo claro y sin ambigüedades.

CG4 - (S1) Que los estudiantes posean las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo.

CTUPM02 - (S3) Organización y planificación. Los estudiantes fijan objetivos, con la planificación y programación de actividades (tiempo y fases) y con la organización y gestión de los recursos necesarios para alcanzarlos.

CTUPM03 - (S4) Liderazgo. Los estudiantes dirigen y coordinan personas para que trabajen con entusiasmo en la consecución de objetivos en pro del bien común.

CTUPM04 - (S5) Uso de la lengua inglesa. Los estudiantes establecen conversaciones con nativos sin tener problemas de comunicación adicionales tanto de forma oral como escrita.

CTUPM05 - (S6) Uso de las tecnologías de la información y comunicación (TIC). Los estudiantes aplican conocimientos tecnológicos necesarios de manera que les permitan desenvolverse cómodamente y afrontar los retos que la sociedad les va a imponer en su quehacer profesional empleando la informática.

CTUPM06 - (S7) Comunicación oral y escrita. Los estudiantes transmiten conocimientos y expresan ideas y

argumentos de manera clara, rigurosa y convincente, tanto de forma oral como escrita, utilizando los recursos gráficos y los medios necesarios adecuadamente y adaptándose a las características de la situación y de la audiencia.

CTUPM07 - (S8) Respeto al medio ambiente. Los estudiantes desarrollan las mejores prácticas para interactuar con el entorno, de forma ética, responsable y sostenible, con el objetivo de evitar o disminuir los efectos negativos que ocasiona la actividad humana, así como promover los beneficios que pueda generar la actividad profesional en el ámbito medioambiental, teniendo en cuenta sus implicaciones económicas y sociales.

CTUPM08 - Trabajo en equipo. Los estudiantes desarrollan la capacidad para trabajar en equipo, integrarse y colaborar de forma activa en la consecución de objetivos comunes.

CTUPM09 - Resolución de problemas. Los estudiantes son capaces de identificar o proponer un problema, y tienen el conocimiento sobre diferentes alternativas metodológicas y estratégicas para resolverlo.

CTUPM13 - Trabajo en contextos internacionales. Los estudiantes son capaces de integrarse en un grupo o equipo, colaborando y cooperando con otros. Tienen la capacidad para trabajar con estudiantes de otras disciplinas y de aceptar la diversidad social y cultural.

3.2. Learning outcomes

RA23 - C: Capacidad para estimar la respuesta dinámica en un grado de libertad y calcular los periodos naturales de respuesta de un flotador

RA24 - H&D: Manejo de códigos de simulación en dominio de la frecuencia y dominio del tiempo para estimación de movimientos y diseño de fondeo.

* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

4. Brief description of the subject and syllabus

4.1. Brief description of the subject

Dynamics of Oceanic Artefacts (DAO) continues the training in buoyancy dynamics started in degree with Hydrodynamics of the Ship II in the GAN degree.

The face-to-face activities are designed for the conventional classroom and the computer room, since support software will be used. The course also includes a lab practice at ETSIN towing tank.

The previous training for DAO must include basic theory of potential flow, provided in the basic subject of Fluid Mechanics.

4.2. Syllabus

1. Introduction. Wave theory: deterministic and probabilistic approximation. Froude-Krylov forces
2. Wave forces in large structures: General difraction-radiation problems. Frequency Domain
3. Single Degree of Freedom (SDOF) dynamic response: natural periods
4. Wave forces in slender structures. Morison equations
5. Time Domain. Response spectra, spectra realization
6. Wind and current forces. VIV
7. Fondeos. // Mooring.
8. Modelization of decay tests. Damping in natural periods
9. Second order effects: drift forces, Maruo formula, QTFs
10. RAOs: short and long wave length limits. Cancellations and Couplings
11. Forced oscillations.

12. From frequency domain to time domain: Cummins equations.

5. Schedule

5.1. Subject schedule*

Week	Type 1 activities	Type 2 activities	Distant / On-line	Assessment activities
1	**0 - Introduction to the course** Duration: 01:00 **Lesson 1** Duration: 02:00			
2	**Lesson 1** Duration: 01:00 **Lesson 2** Duration: 02:00			
3	**Lesson 3** Duration: 02:00	**Software practice. Seakeeping code.** Duration: 01:00		**Moodle task associated to the software session.** Progressive assessment Presential Duration: 00:00
4	**Lesson 3** Duration: 02:00	**Software practice. Seakeeping code.** Duration: 01:00		**Moodle task associated to the software session.** Progressive assessment Presential Duration: 00:00
5	**Lesson 3** Duration: 03:00			
6	**Lesson 4** Duration: 01:30 **Lesson 4** Duration: 01:30			
7	**Lesson 4** Duration: 01:30 **Lesson 4** Duration: 01:30			

8	**Midterm 1: Lessons 1-4** Duration: 01:00	**Software practice. Seakeeping code.** Duration: 02:00		**Midterm 1: Lessons 1-4** Progressive assessment Presential Duration: 00:00 **Moodle task associated to the software session.** Progressive assessment Presential Duration: 00:00
9	**Lesson 5** Duration: 02:00 **Lesson 5** Duration: 01:00			
10	**Lesson 6** Duration: 01:30 **Lesson 6** Duration: 01:30	**Lab Practice.** Duration: 01:15		**Attendance and report of lab practice.** Progressive assessment and Global Examination Presential Duration: 00:00
11	**Lesson 6** Duration: 01:00 **Lesson 7** Duration: 01:00	**Software practice. Seakeeping code.** Duration: 01:00		**Moodle task associated to the software session.** Progressive assessment Presential Duration: 00:00
12	**Lesson 7** Duration: 01:00 **Lesson 7** Duration: 01:00	**Software practice. Seakeeping code.** Duration: 01:00		**Moodle task associated to the software session.** Progressive assessment Presential Duration: 00:00
13	**Lesson 8** Duration: 01:00 **Lesson 8** Duration: 01:00	**Software practice. Seakeeping code.** Duration: 01:00		**Moodle task associated to the software session.** Progressive assessment Presential Duration: 00:00
14	**Lesons 9 & 10 (theory and exercises)** Duration: 02:00	**Software practice. Seakeeping code.** Duration: 01:00		**Moodle task associated to the software session.** Progressive assessment Presential Duration: 00:00
	Lessons 11 & 12 (theory and exercises) Duration: 03:00 **Teamwork presentation and defense** Duration: 01:00	**Software practice. Seakeeping code.** Duration: 01:00		**Team work presentation** Progressive assessment Presential Duration: 00:00 **Moodle task associated to the software session.**

15				Progressive assessment Presential Duration: 00:00 **Nota total de la parte de teoría en evaluación progresiva (todo menos laboratorios)** Progressive assessment Presential Duration: 00:00
16				
17	**Midterm 1 in Final Exam** Duration: 01:30 **Midterm 2 in Final Exam** Duration: 01:30			**Midterm 1 in Final exam** Global examination Presential Duration: 00:00 **Midterm 2: Lessons 5-final. This part is also part of the Global Assessment Test, weighted accordingly (see below).** Progressive assessment Presential Duration: 00:00 **Combined weight of Midterm 1 and 2 in final exam: (40% block1 = Lessons 1_4, 40% block 2 = Lessons 5_end).** Global examination Presential Duration: 00:00

Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

6. Activities and assessment criteria

6.1. Assessment activities

6.1.1. Assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
3	Moodle task associated to the software session.		Face-to-face	00:00	2%	0 / 10	
4	Moodle task associated to the software session.		Face-to-face	00:00	2%	0 / 10	(K4) (K5) CTUPM04 CTUPM05 CTUPM08 CTUPM13
8	Midterm 1: Lessons 1-4		Face-to-face	00:00	22%	3 / 10	CG2 CG4 CG1 CG3 (K4) (K5) CTUPM02 CTUPM04 CTUPM06 CTUPM07 CTUPM09 CTUPM13
8	Moodle task associated to the software session.		Face-to-face	00:00	2%	0 / 10	CTUPM04 CTUPM05 CTUPM08 CTUPM13 (K4) (K5)
10	Attendance and report of lab practice.		Face-to-face	00:00	20%	5 / 10	CG1 CG4 (K4) (K5) CTUPM03 CTUPM04 CTUPM05 CTUPM06 CTUPM08 CTUPM13

11	Moodle task associated to the software session.		Face-to-face	00:00	2%	0 / 10	(K4) (K5) CTUPM04 CTUPM05 CTUPM08 CTUPM13
12	Moodle task associated to the software session.		Face-to-face	00:00	2%	0 / 10	(K4) (K5) CTUPM04 CTUPM05 CTUPM08 CTUPM13
13	Moodle task associated to the software session.		Face-to-face	00:00	2%	0 / 10	(K4) (K5) CTUPM04 CTUPM05 CTUPM08 CTUPM13
14	Moodle task associated to the software session.		Face-to-face	00:00	2%	0 / 10	(K4) (K5) CTUPM04 CTUPM05 CTUPM08 CTUPM13
15	Team work presentation		Face-to-face	00:00	20%	0 / 10	(K4) (K5) CTUPM03 CTUPM04 CTUPM06 CTUPM07
15	Moodle task associated to the software session.		Face-to-face	00:00	2%	0 / 10	(K4) (K5) CTUPM05 CTUPM08
15	Nota total de la parte de teoría en evaluación progresiva (todo menos laboratorios)		Face-to-face	00:00	%	5 / 10	(K4) (K5)
17	Midterm 2: Lessons 5-final. This part is also part of the Global Assessment Test, weighted accordingly (see below).		Face-to-face	00:00	22%	3 / 10	CG3 CG2 CG4 (K4) (K5) CTUPM02 CTUPM04 CTUPM06 CTUPM09 CTUPM13 CG1

6.1.2. Global examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
10	Attendance and report of lab practice.		Face-to-face	00:00	20%	5 / 10	CG1 CG4 (K4) (K5) CTUPM03 CTUPM04 CTUPM05 CTUPM06 CTUPM08 CTUPM13
17	Midterm 1 in Final exam		Face-to-face	00:00	40%	5 / 10	CG3 CG2 CG1 CG4 (K4) (K5) CTUPM02 CTUPM03 CTUPM04 CTUPM05 CTUPM06 CTUPM07 CTUPM08 CTUPM09 CTUPM13
17	Combined weight of Midterm 1 and 2 in final exam: (40% block1 = Lessons 1_4, 40% block 2 = Lessons 5_end).		Face-to-face	00:00	40%	5 / 10	CG1 CG3 CG2 CG4 (K4) (K5) CTUPM02 CTUPM04 CTUPM06 CTUPM07 CTUPM09

6.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
Examen Final + Práctica de Laboratorio: Esta convocatoria funciona como una repetición exacta de la convocatoria correspondiente a la "Prueba de evaluación global".		Face-to-face	02:30	100%	5 / 10	CG1 CG2 CG3 CTUPM09 CTUPM13 (K4) (K5) CTUPM04 CTUPM05 CTUPM06 CTUPM07 CG4 CTUPM02 CTUPM03

6.2. Assessment criteria

Se facilita una rúbrica para el trabajo en grupo, valorando:

Hilo de Moodle: número de entradas, calidad, periodicidad, documentar el contexto de la elección, referencias, etc.., subir ficheros antes de la presentación 30%

Defensa valorando los aspectos técnicos del trabajo, su profundidad, el fichero de presentación, calidad de la defensa, capacidad de respuesta a las preguntas (las pueden responder todos los miembros del grupo), etc.. 70%

Caso de que Jefatura de Estudios (a solicitud de un/a estudiante) indique que una falta a una práctica es justificada, se arbitran las siguientes medidas:

1 Lo primero, se retirará a este/a estudiante del grupo correspondiente formalmente.

2 Se le pasará un vídeo a la persona en cuestión, se le pasarán unos datos, y un pequeño guión de la práctica.
3. La persona en cuestión tendrá que hacer el análisis e informe de prácticas correspondiente.
4. Se le pasará también un artículo de journal científico que tenga conexión con la práctica y se le pedirá que haga un resumen del mismo de entre 600-800 palabras resaltando las conexiones que tenga el artículo con el tema de la práctica.

Si en la convocatoria ordinaria jefatura de Estudios cree que la falta no es justificada, tendrás suspensas las prácticas por no asistir, con lo que ello implica respecto a la convocatoria ordinaria.

En este caso, en la convocatoria extraordinaria, si la persona indica que quiere presentarse, se le propondría exactamente lo mismo que si la falta fuese justificada.

En la prueba de evaluación global en la convocatoria ordinaria y en el examen final en la convocatoria extraordinaria NO habrá nota mínima en las partes en la parte de teoría. Sin embargo, tanto en esas dos pruebas como como en la evaluación progresiva sigue siendo que la nota mínima de la teoría (todo menos las prácticas) es 5/10 de esa parte, y la de las prácticas de laboratorio es 5/10 de esa parte, o sea, teoría y laboratorio no se compensan entre si: hay que aprobar los dos items.

La prueba de evaluación global en la convocatoria ordinaria y el examen final en la convocatoria extraordinaria constarán de dos partes con el peso indicado más arriba.

También se hará la simulación de considerar las partes del final como evaluación progresiva/continua con todo lo que ello implica.

Se tomará el máximo de ambas.

La prueba correspondiente a los temas 1a3 realizada en la "Prueba de evaluación global" NO se guarda para la extraordinaria.

Para la presentación de los trabajos se abrirán varias ventanas de presentación.

La convocatoria extraordinaria funciona como una repetición exacta de la Prueba de evaluación global en la convocatoria ordinaria.

La única salvedad es que el/la estudiante puede querer no examinarse del segundo parcial, caso de que le interese conservar esa nota.

La nota del primer parcial en el final ordinario no se conserva pero sí la del primer parcial durante el curso.

La nota que tendrá el estudiante si una de las partes ("prácticas de laboratorio" y "lo demás") está suspensa, es la correspondiente a la parte suspensa. Por tanto, la nota máxima en la evaluación global y progresiva si una parte está suspensa es el mínimo de ambas partes.

Para las tareas se habilitará una tarea en Moodle para subir la evidencia de haberla realizado. No se puede subsanar no hacerlo dentro del plazo establecido.

****

A rubric is provided for group work, assessing:

Moodle thread: number of entries, quality, periodicity, documenting the context of the choice, references, etc., uploading files before the presentation 30%.

Defence, assessing the technical aspects of the work, its depth, the presentation file, quality of the defence, ability to answer the questions (all members of the group can answer them), etc... 70%

If the Head of Studies (at the request of a student) indicates that an absence from a practical is justified, the following measures will be taken:

1 First of all, this student will be formally withdrawn from the corresponding group.

2 A video will be shown to the person in question, some information will be given to him/her, and a short script of the practical will be given to him/her.

3. The person in question will have to make the corresponding analysis and practice report.

4. They will also be given an article from a scientific journal that has a connection with the internship and will be asked to summarise it in 600-800 words, highlighting the connections between the article and the topic of the internship.

If the Head of Studies considers that the absence is not justified in the ordinary exam session, you will fail the practicals for not attending, with all that this implies with respect to the ordinary exam session.

In this case, in the extraordinary exam, if the person indicates that they want to attend, they will be offered exactly the same proposal as if the absence were justified.

***

In the global assessment test in the ordinary exam and in the final exam in the extraordinary exam, there will be NO minimum mark for the theory part. However, both in these two tests and in the progressive assessment, the minimum mark for the theory (everything except the practical) is 5/10 of that part, and the minimum mark for the laboratory practical is 5/10 of that part, i.e. theory and laboratory do not compensate each other: you have to pass both items.

The overall assessment test in the ordinary exam and the final exam in the extraordinary exam will consist of two parts with the weight indicated above.

There will also be the simulation of considering the parts of the final as a progressive/continuous assessment with

all that this implies.

The maximum of both will be taken.

The test corresponding to topics 1 to 3 taken in the "Global Assessment Test" will NOT be kept for the Extraordinary Examination.

***

For the submission and defense of group works, several submission windows will be opened.

The Extraordinary Examination functions as an exact repetition of the Global Assessment Test in the Ordinary Examination.

The only exception is that the student may wish not to take the second midterm, in case he/she wants to keep that mark.

The mark of the first midterm in the ordinary final is not retained but the mark of the first midterm is retained during the course.

If one of the parts ("laboratory practicals" and "the rest") is failed, the student will get the mark corresponding to the failed part. Therefore, the maximum mark in the global and progressive evaluation if one part is failed is the minimum of both parts.

--

For assignments, a Moodle task will be enabled for uploading evidence of completion. Failure to do so within the

established deadline cannot be remedied.

7. Teaching resources

7.1. Teaching resources for the subject

Name	Type	Notes
Página web de la asignatura. http://moodle.upm.es	Web resource	
Offshore Hydrodynamics. J.M.J Journée y W. W Massie. Delft University of Technology.2001	Bibliography	
"Sea Loads of ships and offshore structures". O.M. Faltinsen. Cambridge. Ocean Technology Series,1990	Bibliography	
Canal de Ensayos Hidrodinámicos	Equipment	Canal de pruebas con modelos físicos para prácticas hidrodinámica
WAMIT, AQWA	Others	Códigos numéricos para cálculo de dinámica de artefactos y buques
Aula de Ordenadores	Equipment	

8. Other information

8.1. Other information about the subject

The timetable follows a theoretical planning of the subject that may undergo modifications during the course.

Attendance sheets will be signed for the laboratory practicals, as well as for the different evaluable tasks.

The software sessions may take place at any class time or in the common time. They will be announced in advance.

For the papers, prior to the defence, the required files (presentation, software, etc.) will be handed in.

****

Goals and targets (of the 2030 Agenda for Sustainable Development)

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

4.3 By 2030, ensure equal access for all women and men to quality technical, vocational and higher education, including university education This objective is being pursued by striving for equal training for men and women in technical education associated with the subject.

Goal 5. Achieve gender equality and empower all women and girls

5.1 End all forms of discrimination against all women and girls everywhere Work towards this objective by striving to provide equal training for men and women in the technical training associated with the subject area.

5.5 Ensure women's full and effective participation and equal opportunity for leadership at all levels of decision-making in political, economic and public life Women's participation in presentations and other activities, such as debates, with a public exposure component will be promoted.

Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all

7.2 By 2030, significantly increase the share of renewable energy in the energy mix Training is being conducted in float dynamics, which will have an impact on the design of more efficient devices for marine renewable energy generation.

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

8.9 By 2030, develop and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products The nautical sector is of great importance to tourism in Spain. The challenges of the subject have an impact on the design of more sustainable recreational boats for tourist use.

Goal 9. Build resilient infrastructures, promote inclusive and sustainable industrialization, and foster innovation

9.5 Increase scientific research and upgrade technological capabilities in industrial sectors in all countries, in particular developing countries, including by fostering innovation and significantly increasing the number of research and development personnel per million inhabitants and public and private sector expenditure on research and development by 2030 The subject is designed as a challenge and encourages training in innovation-related skills.

Goal 13. Adopt urgent measures to combat climate change and its effects2 13.1.

13.2 Incorporate climate change measures into national policies, strategies and plans The course is a challenge with electric propulsion, linked to training in the reduction of GHG emissions.

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development.

14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution The subject poses a challenge with electric propulsion, linked to training in GHG emission reduction, and pollution reduction in the oceans.

14.b Facilitate artisanal fishermen's access to marine resources and markets The course prepares students to design better fishing vessels, which has an impact on this goal. In fact, the course coordinator has participated in 2023 in a United Nations-FAO project to improve the energy efficiency of artisanal fishing vessels for developing countries.