Course guide
280663 - 280663 - Naval Technology and Mechanics

Last modified: 26/06/2024

Unit in charge: Barcelona School of Nautical Studies
Teaching unit: 742 - CEN - Department of Nautical Sciences and Engineering.

Degree: BACHELOR'S DEGREE IN NAVAL SYSTEMS AND TECHNOLOGY ENGINEERING (Syllabus 2010). (Compulsory subject).

Academic year: 2024 **ECTS Credits:** 9.0 **Languages:** Catalan, Spanish, English

LECTURER

Coordinating lecturer: JORGE TORRALBO GAVILAN

Others:

Primer quadrimestre:
MANUEL RODRIGUEZ CASTILLO - DT, GESTN
JORGE TORRALBO GAVILAN - DT, GESTN

Segon quadrimestre:
MANUEL RODRIGUEZ CASTILLO - GSDT1, GSDT2, GSDT3
JORGE TORRALBO GAVILAN - GSDT1, GSDT2, GSDT3

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
2. Process and mechanical engineering.
3. Process and assembly machines onboard equipment and systems.

Transversal:
1. TEAMWORK - Level 2. Contributing to the consolidation of a team by planning targets and working efficiently to favor communication, task assignment and cohesion.

TEACHING METHODOLOGY

Expositive classes, interventions, group work, written work, problem solving, information search, visits and practices.
Incorporate the gender perspective.

LEARNING OBJECTIVES OF THE SUBJECT

Know the processes of obtaining metals, metallurgy and steel.
Know the shaping of metals for foundry, forge, laminar and extrusion trains.
Know the processes of mechanical manufacturing, machine tools and parts mechanization.
Know the main techniques of joining metals by welding and its application.
Know the main measurement instruments used for the verification of parts.
Be able to work as a member of a team, either as a member, or performing management tasks with the aim of contributing to developing projects with pragmatism and feeling of responsibility, assuming commitments considering the available resources.

This course is included in the first UPC Gender and Teaching Project whose main aim is to incorporate the gender perspective in diferent degree courses.

STUDY LOAD

Type	Hours	Percentage
Hours small group	18,0	8.00
Self study	135,0	60.00
Hours large group	54,0	24.00
Hours medium group	18,0	8.00

Total learning time: 225 h

CONTENTS

Metals in the naval industry.

Description:
Classification and properties of metals. Extraction of iron (Fe). High furnaces. Steels and foundries. Refining of steel. Forging, forging process. Ferrous and non-ferrous metals used in the shipbuilding industry. Thermal, thermochemical and surface treatments of metals. Fe-C diagram. Hardness of metals.

Full-or-part-time: 14h
Theory classes: 12h
Practical classes: 2h

Basic tools and manual mechanical processes.

Description:
Basic tools in a mechanical workshop. Flat and air layout. Roughness and abrasives. Aspects related to work safety in mechanical workshops.

Full-or-part-time: 6h
Theory classes: 6h

Metrology

Description:
The nonius. Vernier caliper and micrometer. Verification devices. Marbles. Comparator. Goniometers. Sizing and tolerances. Mounts and measurements.

Full-or-part-time: 6h
Theory classes: 4h
Practical classes: 2h

(ENG) Soldadura.

Description:
Welding concept Weldability of steels. Type of welding: homogeneous and heterogeneous. Electric arc welding techniques: Manual for coated electrode, MIG-MAG, TIG, Arcsubmergit. Gas welding: oxyacetylene. Welding by capillarity. Cold and contact welding. Type of joints. Symbology. Tensions and deformations in the welds. Welding defects Welding positions. ASME code section IX. Welding processes in shipyards. ISO and AWS regulations.

Full-or-part-time: 30h
Theory classes: 20h
Practical classes: 10h

Metal cutting processes: Tooling machines

Description:
Metal cutting processes. Types of tooling machines. Lathe: jobs and tools. Milling machine: Jobs and tools. Conventional machines and numerical control machines. Tooling parameters. Introduction to Computer Numerical Control machines (CNC) - Lathe and milling machine. Controls FAGOR and SINUMERIK

Full-or-part-time: 24h
Theory classes: 16h
Practical classes: 8h

Detachable joints: Threads, screws and nuts.

Description:
Types of thread profiles: Whitworth thread and Metric thread: types. Screws: Types of screws and nuts. Security systems.

Full-or-part-time: 10h
Theory classes: 8h
Practical classes: 2h

GRADING SYSTEM

The final grade is the sum of the partial grades as follows:
Nfinal= 0,5 Npf + 0,2 Npp + 0.2 Npr + 0,1 Nad
NPF: Note-test final exam
PPN: Note-test partial exam
NPR: Practical Note
Nad: Note supervised activities
The test will be held on reevaluation and time specified by the Faculty. Consist of a single test may be submitted only the students who meet the requirements set out in the undergraduate academic regulations of the FNB.

EXAMINATION RULES.

Attendance at practices is mandatory. The subject cannot be passed without passing the practices. The minimum attendance at practices will be greater than 80% of the scheduled practices.
Attendance at theoretical classes will be taken into account at the time of the final evaluation.
It will be considered not presented (NP) when all the tests are not carried out.
The evaluation tests may contain theoretical, practical or problem-solving tests.
Failure to reach a minimum score of 3.0 in the final test-exam grade (Npf) will result in failing the subject and the maximum achievable total grade for the subject being 4.0.
The reevaluation test will be carried out on the day and time indicated by the Faculty. It will consist of a single test, and only students who meet the requirements established in the academic regulations for FNB Degree studies will be able to take it.

BIBLIOGRAPHY

Basic:

- Coca Rebollero, Pedro; Rosique Jiménez, Juan. Tecnología mecánica y metrotecnia. 6a ed. Madrid: Pirámide, 1996. ISBN 843681663.
- Giachino, Joseph W.; Weeks, William R. Técnica y práctica de la soldadura. Barcelona: Reverté, 1981. ISBN 8429160531.
- Lasheras Esteban, José Mª. Tecnología mecánica y metrotecnia. San Sebastián: Donostiarra, 1984. ISBN 8470630873.
- Morral, F. R.; Jimeno, Emilio; Molera i Solà, Pere. Metalurgia general. Barcelona: Reverté, 1982-1985. ISBN 9788429160710.
- Rivas Arias, José María. Soldadura eléctrica y sistema T.I.G. y M.A.G. 9a ed. Madrid: Paraninfo Cengage learning, 2008. ISBN 9788428307420.
- ASM handbook, vol. 6, Welding, brazing and soldering. 9th ed. Maetals Park, Ohio: American Society for Metals, [1978-1989?]. ISBN 0871700123.
- Miguélez Garrido, M Henar; Cantero Guisánchez, José Luís. Problemas resueltos de tecnología de fabricación. Madrid: International Thomson, 2005. ISBN 8497323459.
- Jeffus, Larry. Soldadura : principios y aplicaciones. 5a ed. Madrid: Paraninfo, 2009. ISBN 9788428329378.
- Mott, Robert L. Diseño de elementos de máquinas. 4a ed. México: Prentice Hall, 2006. ISBN 9702608120.
- Norton, Robert L. ; Ríos Sánchez, M. Ángel. Diseño de maquinaria : síntesis y análisis de máquinas y mecanismos [on line]. Quinta edición. Madrid: McGraw-Hill Education, [2013] [Consultation: 04/07/2024]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=5701. ISBN 9781456239770.
- Alonso Marcos, Carlos. Interpretación de planos en soldadura : UF1640. Madrid: Paraninfo, 2021. ISBN 9788413660325.
- Roldán Viloria, José. Control y verificación de productos fabricados : UF0443. Madrid: Paraninfo, 2021. ISBN 9788413660691.
- Roldán Viloria, José. Operaciones básicas y procesos automáticos de fabricación mecánica : UF0442. Madrid: Paraninfo, 2021. ISBN 9788413660561.
- Luque Romera, Francisco Javier. Máquinas, herramientas y materiales de procesos básicos de fabricación. FMEE0108 [on line]. Antequera: IC Editorial, 2022 [Consultation: 04/07/2024]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=31130741. ISBN 84-11-03227-2.
- Cueto Martos, José. Soldadura con electrodos revestidos de estructuras de acero carbono, inoxidables y otros materiales: UF1625 [on line]. Murcia: Cano Pina, 2017 [Consultation: 04/07/2024]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=5307426. ISBN 84-17119-17-5.
- Bertolín Gil, Sergio. Procesos de mecanizado. Barcelona: Marcombo, 2013. ISBN 9788426720542.

Complementary:

- Bartsch, Walter. Herramientas máquinas trabajo : con ejercicios y ejemplos. Barcelona: Reverté, 1978. ISBN 8429160213.
- ASM handbook, vol. 11, Failure analysis and prevention. Metals Park, Ohio: American Society for Metals, [1978-1989?]. ISBN 0871700174.
- Gerling, Heinrich. Medición de longitudes : libro de consulta acerca de los procedimientos de medición en fabricación. Barcelona: Reverté, 1979. ISBN 8429160523.
- ASM handbook, vol. 8, Mechanical Testing. Metals Park, Ohio: American Society for Metals, [1978-1989?]. ISBN 087170014X.
- Pérez del Río, José. Tratado general de maquinas marinas. vol. 4 [on line]. 2a ed. corregida y ampliada. Barcelona: Planeta, 1967 [Consultation: 04/07/2024]. Available on: http://hdl.handle.net/2117/130277 .
- Reina Gómez, Manuel. Soldadura de los aceros : aplicaciones. 5a ed. Madrid: Weld-Work, 2012. ISBN 9788461605781.