



## COURSE DETAILS

“ DESIGN OF AUTONOMOUS MARINE VEHICLES ”

SSD ING-IND/01

DEGREE PROGRAMME: AUTONOMOUS VEHICLE ENGINEERING (MOVE)

ACADEMIC YEAR 2022-2023

## GENERAL INFORMATION – TEACHER REFERENCES

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## GENERAL INFORMATION ABOUT THE COURSE

YEAR OF THE DEGREE PROGRAMME: II

SEMESTER: II

CFU: 9

## REQUIRED PRELIMINARY COURSES (IF MENTIONED IN THE COURSE STRUCTURE “REGOLAMENTO”)

None

## PREREQUISITES (IF APPLICABLE)

None

## LEARNING GOALS

*The course is intended to:*

- *complete student knowledge about different types, mission profiles and general layouts of unmanned/autonomous surface marine vehicles;*
- *provide insight and hands-on experience on state-of-the-art approaches and technologies;*
- *present practical cases of design and development of autonomous surface marine vehicles working with experimental datasets and/or with real hardware.*

## EXPECTED LEARNING OUTCOMES

### **Knowledge and understanding**

Students should complete their knowledge regarding design options and state of the art technologies for autonomous marine vehicles operations and missions

### **Applying knowledge and understanding**

Students should learn how to apply their knowledge in designing autonomous marine vehicles tailored for specific missions, and should develop a practical understanding of the aspects relevant for preliminary performance assessment.

## COURSE CONTENT/SYLLABUS

*First Part – Selected topics and tutorials*

*Selected Topics [5 CFU]*

- Types of AMV and different mission profiles
  - Unmanned merchant ships and shuttles
  - Unmanned marine vehicles for data acquisition
  - Unmanned marine vehicles for Navies
- - Measurement uncertainty estimation according to GUM Data-base analysis and Design procedure
- - Hydrodynamic performance and horsepower assessment
- - Propulsion and energy storage for small size AMV
- - Static stability, theory and evaluation
- - Dynamic stability aspects, self-righting and surviving capabilities for small size AMV
- - AMV behavior at sea, seakeeping
- - Design features for Dynamic Positioning
- - Maneuverability of AMV
- - Hull-forms for small AMV
- - Tank testing for AMV
- - Regulatory frame

*Second Part – Preliminary design [4 CFU]*

*The focus is set on development and presentation of the preliminary design of an autonomous/unmanned marine vehicle.*

## READINGS/BIBLIOGRAPHY

Slides, lecture notes, technical papers. Textbooks :

Roberts G.N. and Sutton R., Further Advances in Unmanned Marine Vehicles– Control Engineering Series, 2012

## TEACHING METHODS

Lectures (approx. 60 % of total hours), interactive/laboratory activities (approx. 40% of total hours)

## EXAMINATION/EVALUATION CRITERIA

### a) Exam type:

Exam type	
written and oral	
only written	
only oral	X
project discussion	X
other	

### b) Evaluation pattern:

*The final grade is formulated by the Examination Committee according to the scores achieved by the student in the discussion of the final project work and of the oral questions.*

*The final evaluation is discussed and highlighted to each student*