

**Course offered for the PhD program  
in Civil, Chemical and Environmental Engineering  
Curriculum in Structural and Geotechnical Engineering, Mechanics and Materials  
Curriculum in Wind Science and Engineering  
A.Y. 2019/2020 (XXXV cycle)**

(possibility of participation for students in other PhD cycles or other PhD courses)

**1. Title**

Reliability methods for structural assessment – Applications for offshore structures

**2. Course description**

The main aim of the course is to introduce the reliability approach for structural assessment, providing the students with relevant cases of application, such as the reliability based fatigue design and the assessment of existing structures.

These topics have been specifically addressed for the assessment of existing offshore structures, dominated by wave loads, however they are of general interest for structures whose response is mainly governed by variable environmental loads.

**3. Course Organization**

*Recap on structural reliability methods and design codes based on semi-probabilistic approach (2 hours):* The fundamental of structural reliability. Different methods for reliability evaluation. Probabilistic and Semi-probabilistic methods, historical overview. Load and Resistance Factors Design codes. Design target and partial safety factors calibration procedure. LRFD format compared to traditional working stress approach. Benefits in design.

*Brief introduction to offshore structures (3 hours)* Different types of offshore structures. Installation for Drilling and Production. Selection of offshore structure type in relation to dynamic properties. Fixed offshore jacket structures peculiarities and relevant design issues.

*Fatigue assessment of offshore structures based on reliability methods (3 hours):* Introduction to fatigue issues for steel jackets. Spectral fatigue analysis of offshore jackets. Reliability methods for tubular joints fatigue assessment. Crack growth issue and time dependent fatigue evaluation Safety index updating following to inspection outcome. Reliability based inspection planning and optimization of maintenance cost for existing structures.

*Assessment of existing fixed offshore platforms (2 hours):* Management of safety for existing structures. Role of the inspection task. System reliability approach and application to existing fixed offshore steel platforms life extension.

**4. Lecturer**

Ing. Stefano Copello  
Head of Energy Certification  
RINA Services, Genoa, Italy  
[stefano.copello@rina.org](mailto:stefano.copello@rina.org)

**5. Duration and credits**

10 hours (2 credits)

## **6. Activation mode and teaching period**

The course will be held in the second half of November / first half of December, divided into 5 lessons of 2 hours. The minimum number of participants to activate the course is 3.

## **7. Deadline for registration**

The deadline for applications is indicatively November 15<sup>t</sup>, 2019. Please, send an e-mail confirmation to [stefano.copello@rina.org](mailto:stefano.copello@rina.org).

## **8. Final exam**

Test examination at the end of the course

## **9. Recommended references**

- Lecture notes provided by Ing. Copello (partially in Italian);
- H.O. Madsen, S. Krenj, N.C. Linf. – Methods of Structural safety, Dover, 2004;
- S.K. Chakrabarti – Handbook of Offshore Engineering, 2 Voll., Elsevier 2005.