REGISTRATION FORM

Name _____

Address _____

_____

_____

Tel. _____

Email _____

☐ I wish to register for the course at a cost of £750 +VAT (UK only) including course material and workshop lunches.

☐ I enclose a cheque for £750+VAT

☐ Please invoice me at the above address

☐ Please send me information on local hotels

Disclaimer

All materials and information supplied during and associated with this course are intended purely for instructional purposes. Whilst every effort is taken to ensure that materials provided are accurate and suitable for training purposes, ASRANet Ltd accepts no responsibility for their accuracy or utility.

I accept the above.

Signature _____

Date _____

The completed form should be sent to:
ASRANet Ltd.
5 St Vincent Place, Glasgow, G1 2DH

Cost

The registration fee of the workshop will be £750 which includes course notes and lunches. You should make your own arrangements for accommodation.

Payment

ASRANet Ltd. accepts payments by cheque, cash and bank transfer. Please contact for further details.

Venue

ASRANet Ltd.
St Georges Building
5 St Vincent Place
Glasgow, G1 2DH
Scotland, UK

Note

Please do not make your travel arrangements until you receive an Invoice from us.

Contact

ASRANet Ltd.
St Georges Building
5 St Vincent Place
Glasgow, G1 2DH
Scotland, UK
W www.asranet.co.uk
E info@asranet.co.uk
T +44 (0) 141 275 4801
F +44 (0)141 275 4800

Foundation Design of Offshore Wind Turbine Structures

22-23 August 2017

ISO 9001:2015 certified company

(A maritime company for courses, conferences and research)

Glasgow, UK

About the Course

The costs of offshore wind are currently, significantly higher than onshore wind. A significant contributor to this higher cost is the cost of the foundations for the turbines. Hence a rational and optimized design of foundation for wind turbines is essential to reduce the overall cost.

This course gives a detailed knowledge about the design and analysis of mono pile, Suction piles, and jacket structure foundations. This course also includes the soil pile interaction and the dynamic responses.

The course will include both ultimate and fatigue limit state check for the design of these types of foundations. The uncertainties of various design variables will also be discussed in these lectures. Lastly a reliability based design of suction pile will be covered.

Who Should Attend

Engineers and researchers involved in the design of offshore wind farm foundation, Contracts engineers, Wind turbine Installation companies, Team leaders, Conversion Engineers, Project engineers and managers, offshore controls engineers, Safety inspectors will benefit from attending this course. The course is innovative in both content & structure with a careful balance of theory & practice.

PROGRAMME

Tuesday 22nd August 2017

09.00 - 10.30	Lecture 1: Overview of the whole Wind Turbine structure *Prof. Subhamoy Bhattacharya*
10.30 - 11.00	*Break*
11.00 - 12.30	Lecture 2: Loads on the offshore wind turbine structure *Prof. Subhamoy Bhattacharya*
12.30 -13.30	*Lunch*
13.30 – 15.00	Lecture 3: Consideration for foundation design and the calculations necessary *Dr. Domenico Lombardi*
15.00 - 15.30	*Break*
15.30 - 17.00	Lecture 4: Geotechnical Site Investigation and Soil behaviour under cyclic loading *Dr. Domenico Lombardi*

Wednesday 23rd August 2017

09.00 - 10.30	Lecture 5: Soil Structure Interaction (Cyclic and dynamic) *Prof. Subhamoy Bhattacharya*
10.30 - 11.00	*Break*
11.00 - 12.30	Lecture 6: Simplified hand calculation of case studies *Prof. Subhamoy Bhattacharya*
12.30 - 13.30	*Lunch*
13:30-15:00	Lecture 7: Introduction to Bladed for offshore wind turbine and foundation modelling *Mr Alec Beardsell*
15:30-17:00	Lecture 8: Demonstration of offshore foundation load calculations in Bladed (ULS and FLS analysis) *Mr Alec Beardsell*

CV'S OF LECTURERS:

Professor Subhamoy Bhattacharya:

Professor Subhamoy Bhattacharya currently holds the Chair in Geomechanics at the University of Surrey where he leads the Geomechanics Research Group. He is also the Programme Director for the MSc course in "Advanced Ground Engineering/Advanced Geotechnical Engineering" and the Director of Undergraduate Studies in Civil Engineering. Previously, he held the post of Senior Lecturer at the University of Bristol, Departmental Lecturer at the University of Oxford and Academic fellowship at Tokyo Institute of Technology as well as industrial positions with Fugro Limited (UK) and Consulting Engineering Services (India) Ltd - now Jacobs. He obtained his PhD from the University of Cambridge, investigating failure mechanisms of pile-supported structures in liquefiable soils. He proposed a new theory on pile failure which received the 2005 T.K.Hseih award for the best paper in civil engineering dynamics from the Institution of Civil Engineers. His further work on piles includes design principles for the foundation design of new generation Floating Production Storage and Offloading platforms, built from his experience designing piles for more conventional offshore structures. His work on p-y curves for clay appears in the latest API/ANSI/ISO code of practice. His current research interest are foundations for offshore wind turbines, seismic behaviour of piles.

Dr Domenico Lombardi:

Dr. Domenico Lombardi is currently a lecturer in Geotechnical engineering at The University of Manchester. After graduating with a first class honours (with distinction) in Civil Engineering from the University of Sannio (Italy), Domenico moved to the University of Bristol to finish his postgraduate studies, first with an MSc in Offshore Engineering and then with a PhD in Earthquake Engineering. His doctoral studies focused on the effects of soil liquefaction on the dynamic behaviour of pile-supported structures. Before joining The University of Manchester, he was appointed as a Foreign Researcher in the Department of Civil and Environmental Engineering at Yamaguchi University (Japan), where he investigated the cyclic behaviour of soils and conducted a series of field surveys in the area hit by the 2011 Tōhoku earthquake and subsequent tsunami. Domenico is author of over 20 publications focusing on different civil engineering problems, including long-term performance of offshore wind turbines and design of structures in liquefiable soils. His main research interests are in geotechnics and structural dynamics, related to problems of offshore engineering and behaviour of structures under repetitive loading

Mr Alec Beardsell

Alec Beardsell is a Senior Loads Analysis Engineer in the Turbine Engineering Support department of DNV GL Energy. His work involves using Bladed to perform load calculations and performance assessments for wind turbine designers and manufacturers around the world. As well as contributing to the design of onshore, offshore, floating and tidal turbines, he is engaged with turbine life extension projects, and turbulence modelling. Alec also regularly provides lectures, training material and resources to support undergraduate and masters level engineering courses at a range of universities including Oxford, Bristol, Cardiff and Cranfield. Alec holds a Masters degree in Physics from the University of Oxford and is a member of the Institute of Physics. He also has an MSc (with distinction) in Renewable Energy Systems Technology from Loughborough University, where he was awarded the Professor Leon Freris prize for his thesis on Non-Linear Wind Turbine Blade Modelling. Before working in engineering, Alec enjoyed a successful career in teaching. He has a PGCE from Cambridge University and has worked in four different schools in three different countries.

Content of the lectures:

Lecture 1: Overview of the whole Wind Turbine structure

General overview of the overall wind turbine structure/wind farm keeping in mind the concepts necessary for foundation design: [Wind Turbine Structure - Dynamic sensitive nature, brief review of the turbine types, general considerations on the selection of site (wind speed, water depth, wave and current, ground type), cut-in and cut-out speed, natural frequency of wind turbine system]. Types of foundations either in use or proposed. Dynamics of these structures on different types of foundations.

Lecture 2: Loads on the offshore wind turbine structure

This lecture will focus on the main loads on the structure from wind, wave, 1P and 3P with the aim to obtain the mudline bending moment for foundation design. Also this lecture will describe a simple frequency domain methodology to obtain the critical loads (overturning mudline moment, lateral and vertical loads) in the foundation due to the 4 types of loads. An EXCEL example will be taken to show the methodology.

Lecture 3: Consideration for foundation design and the calculations necessary

The design consideration includes the following Limit States: ULS (Ultimate Limit State), SLS (Serviceability Limit State) and FLS (Fatigue Limit State). Issues related to installation will also be discussed. This section will also discuss the calculations that needs to be carried out the designers: (a) ultimate capacity of the foundation; (b) natural frequency of the whole system; (c) deflection and rotation of the foundation; (d) long term tilting of the foundation and change in natural frequency.

Lecture 4: Geotechnical Site Investigation and Soil behaviour under cyclic loading

This lecture will discuss the site investigation necessary and the soil testing required for obtaining the design parameters for carrying out the design. The lecture will also discuss the advanced soil testing apparatus that may be used to obtain the parameters.

Lecture 5: Soil Structure Interaction (Cyclic and dynamic)

Explain the various Soil-Structure-Interaction and simplified methods that can be to carry out soil-structure analysis will be described. The analysis are: (a) Natural frequency of wind turbine structure considering the foundation flexibility based on a mathematical model; (b) Minimum requirement of foundation stiffness (Translational, Rotational and Cross-Coupling) from SLS; (c) Prediction of rotational and tilting of the wind turbine; (c) Long term rotation prediction.

Lecture 6: Simplified hand calculation of case studies

This lecture will take an example of a wind turbine along with wind, wave and geotechnical data to carry out step by step calculations.

Lecture 7: Introduction to Bladed offshore wind turbine and foundation modelling:

This lecture will provide a general overview of the aero-servo-hydro-elastic software Bladed and the different engineering models behind the code in order to represent the coupled dynamics of offshore wind systems. Special focus will be given to the offshore aspects of it, covering both the metocean environmental conditions and offshore foundation modelling. An overview of the different links with other engineering codes for offshore design will also be provided such as Sesam, Ansys Asas and Sacs.

Lecture 8: Demonstration of offshore foundation load calculations in Bladed (ULS and FLS analysis):

A practical demonstration will be shown for the typical load calculations workflow in Bladed in order to compute both ultimate and fatigue loads for offshore foundations, from turbine/foundation/soil inputs up to postprocessing the loads results.