ABOUT THE COURSE

This course will deal with both the loading of offshore floating structures. There will be twelve lectures in total, each of 90 minutes duration. The initial lectures will cover hydrodynamic loading and will include environmental loads and motions, buoyancy and stability, catenary and tension-leg mooring, Dynamic Positioning systems and the design of semi-submersible structures. The lectures will also cover the structural concept of floating structures in terms of function and safety. Stiffened plates which consist a large parts of floating structures will be dealt in detail, including structural response of stiffened plate and standards and guidelines. The structural response of stiffened shells will be dealt in detail including structural reliability. An introduction to structural reliability. Finally, the structural design of tanker conversions to FPSOs will be dealt with.

The course aims to teach the principles of design and analysis methodology of floating structures which includes semi-submersibles, sparce and tension-leg platforms. The course will teach how to calculate the hydrodynamic loading using various wave theories. From a structural point of view, the course will teach the first principle design of unstiffened and stiffened plates, structural reliability and hull girder strength of FPSOs.

WHO SHOULD ATTEND

Engineers and researchers involved in the design of offshore floating structures, Contracts engineers, Offshore installation companies, Team leaders, Conversion Engineers, Project engineers and managers, offshore controls engineers, Safety inspectors will benefits from attending this course. The course is innovative in both content & structure with a careful balance of theory & practice

COST

The registration fee of the workshop will be £850 + VAT (UK only) which includes course notes and lunches. You should make your own arrangements for accommodation.

PAYMENT

Payments can be made by cheque (made payable to ASRANet Ltd.), cash or bank transfer. Please enquire for 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

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Offshore Floating Structures Design

This course meets the requirement for Continuing Professional Development (CPD) of the Royal Institution of Naval Architects (RINA)

10-12 September 2018
Glasgow, UK

PROGRAMME

Monday 10th September

08.40 - 09.00 Delegate Registration

09.00–10.30 Lecture 1: Environmental Loads
Dr Omar Khattab

10.30 - 10.45 *Break*

10.45 - 12.15 Lecture 2: Buoyancy and Stability
Dr Omar Khattab

12.15 - 13.30 *Lunch*

13.30 - 15.00 Lecture 3: Catenary Mooring System
Dr Omar Khattab

15.00–15.30 *Break*

15.30 - 17.00 Lecture 4: Tension-Leg Mooring System
Dr Omar Khattab

Tuesday 11th September

09.00 – 10.30 Lecture 5: Semi-submersible Design I
Dr Omar Khattab

10.30 - 10.45 *Break*

10.45 - 12.15 Lecture 6: Semi-submersible Design II
Dr Omar Khattab

12.15 - 13.30 *Lunch*

13.30 - 15.00 Lecture 7: Structural Response I
Prof Purnendu Das

15.00–15.30 *Break*

15.30 - 17.00 Lecture 8: Structural Response II
Prof Purnendu Das

Wednesday 12th September

09.00 – 10.30 Lecture 9: Structural Response III
Prof Purnendu Das

10.30 - 10.45 *Break*

10.45 - 12.15 Lecture 10: Reliability and Safety Engineering
Prof Purnendu Das

12.15 - 13.30 *Lunch*

13.30 - 15.00 Lecture 11: Tanker Based FPSOs
Prof Purnendu Das

15.00–15.30 *Break*

15.30 - 17.00 Lecture 12: Tutorials on Stiffened Shells and Hull Girders
Prof Purnendu Das

CV'S OF LECTURERS:

Prof Purnendu Das. BE, ME, PhD, C.Eng, C.MarEng, FRINA, FIStructE, FIMarEST has been the Director of 'ASRANet Ltd' (an ISO 9001-2008 certified company) since February 2006. He retired as a Professor of Marine Structures in the Department of Naval Architecture & Marine Engineering at the University of Strathclyde, UK in September 2011. Past EU projects were MARSTRUCT (a network of excellence on Marine Structure) and SHIPDISMANTL (a cost effective and environmentally friendly dismantling of ship structures). Past industrial projects included work from the UK Health and Safety Executive (HSE), MoD UK, Subsea-7 UK, Shell, Woodgroup and US Navies etc. He was the principal investigator of many EPSRC projects. Before joining the University of Glasgow in 1991 he worked with British Maritime Technology as Principal Structural Engineer (1984-91). He is the author of more than 250 publications, including contract reports and more than 60 journal papers and is a member of the editorial boards of the 'Journal of Marine Structures', 'Journal of Ocean and Ship Technology' and 'Journal of Ocean and Climate System' and the Journal of Ship Mechanics amongst others. His areas of research include limit state design and analysis & reliability analysis of ship & offshore structures. Purnendu Das has wide ranging industrial and academic contacts and has advised and supervised 20 PhD students, to his credit. Details of visits and collaborations include his various sabbatical study periods spent at University of California, Berkeley, USA (July – September 1996), at Lloyd's Register of Shipping (August 1997), Kockums Ltd (July 1998) and spent some time at Instituto Superior Técnico (IST), Lisbon (July 2000). He is running about 20 CPD courses which are attracting many people from different industries. These courses are on 'Fatigue & Fracture Analysis', 'Ships at Sea', 'Advanced Analysis and Design of Offshore Structures', 'Offshore Floating System Design', 'Structural Response under Fire and Blast Loading' and 'Design of Pipelines and Risers' amongst others. He was a member of ISSC (International Ship and Offshore Structure Congress) for the periods of 1991-97 and 2003-2006. He was a member of the OMAE (Offshore Mechanics and Arctic Engineering) Organising Committee on 'Safety and Reliability'. He is running about 15 bi-annual international conferences on various themes like Risk, Reliability, Advanced Analysis & Design of Engineering Structures, including marine structures. He was a member of the "Research Committee" of Structural Engineers (IStructE) during 2012-2015. He was a visiting Professor at IST Surabaya, Indonesia from July 2015 for one year. He is now a visiting professor at the Wuhan University of Technology, China from July 2016.

Dr Omar Khattab *BSc, MSc, PhD, CEng, FRINA,MSANJ* has been an independent consultant since 2007 working for various clients including Brooks Bell Jarret Kierman, Safety at Sea Ltd., Milford Haven Port Authority, SvitzerMarine Ltd., Port of Belfast, Lloyds Register EMEA, Clydeport Operation Ltd. and SACH Solicitors amongst others. Prior to becoming an independent consultant, Dr. Khattab was a lecturer at Alexandria University, Egypt, where he gained his undergraduate degree, for 5years. He obtained his MSc degree in Hydrodynamics from Alexandria University and his PhD from Japan in 1979. He then spent 5 years with the British Ship Research Association (BSRA) as Principal Research Officer at the Naval Architecture Department. During 1988-1993, Dr. Khattab worked in Senior and Management positions at BMT in the Ship Performance Department, the Fluid Dynamics Group and the Hydrodynamic Services at BMT CORTEC Ltd. After this spell at BMT, he returned to lecturing at Southampton Institute where he began as Sen-ior lecturer for 2 years and was quickly promoted to Head of Maritime Technology. Dr. Khattab then moved to Brookes Bell Jarret Kirman in 2000 be-fore beginning work as R & D Manager at Safety at Sea Ltd where he stayed until he began consultancy work. Dr. Khattab is a Fellow of Royal Institute of Naval Architects, a member of Japan Society of Naval Architects as well as a member of Kansai Society of Naval Architects. His areas of expertise include Ship Grounding and Collision, Hull Form Design, Fluid Mechanics, Ship Construction and Ship hydrodynamics amongst many others. His Consultancy work has included the Investigation of

handling behaviour of new generation of Cruise Liners in Miami Harbour and the Design of berthing Jetty for Svitzer tugs in Milford Haven to name a few.

Content of the lectures:

Lecture 1: Environmental Loads
Wave load; Linear wave theory; Basic assumptions; Governing equations; Solution of linear wave; Wave energy (Potential and kinetic); Kinematics of water particles; Particles velocity and accelerations; Statistical description of sea waves; Idealised wave spectral families: JONSWAP, Bretschneider (ISSC), Pierson Moskowitish spectrums; Vortex shedding induced loads; Wave load on large bodies "Diffraction theory"; Wind loads; Current loads.

Lecture 2: Buoyancy and Stability
Flotation Principle of Archimedes; Centre of buoyancy; Static equilibrium; Sinkage, trim, combined heel and trim. Intact stability; Transverse stability; Longitudinal stability effect of free liquids and special cargoes; Curves of statical stability; Influence of hull form on ship stability; Factors affecting transverse stability; Dynamical stability. Flooding and damage stability; Damage stability calculations; Floodable length curves. Stability standards; Intact stability; Subdivision and damage stability.

Lecture 3: Catenary Mooring System
Statics of mooring lines; Heavy and short cable (catenary); Naturally buoy-ant cables; All forces considered-Mooring with elasticity; Two dimensional mass-spring system; Statics of multiple leg mooring system; Method of imaginary reaction; Load excursion static equilibrium; Cable equilibrium in three dimensional. Dynamics of mooring lines; Significance of line dynam-ics; Mooring line as continuous medium; Cable wave equation; Solution of wave equation; Mooring line as mass spring system; Equation of restoring force; Damping force-exciting force.

Lecture 4: Tension-Leg Mooring System
Dynamics of moored structure; Dynamic load and response analysis; Mo-tion characteristics; Stiffness effect on wave frequency motions; Shallow water effect; Slow drift due to wind and waves; Damping of slowly varying
Response; Transient analysis. Tension leg platforms advantage and limita-tions; Tether system design; Functional requirements; Configurations; Tether make-ups; Single tether analysis; Hydrodynamic loading; Modal analysis; Functional Requirements.

Lecture 5: Semi-submersible Design-I
Design procedure; Design Regulations; Conceptual design criterion; Gen-eral arrangements; Gravity load-Icing load; Steady environment forces; Wind, current and waves; Resistance and propulsion; Hydrodynamic forc-es; Operational loading; Wave Loading; Drag and Diffraction forces; Stabil-ity requirements; Intact, Subdivision and damage stability.

Lecture 6: Semi-submersible Design II
Seakeeping motions; Hydrodynamic response criteria; Calculation procedure of the seakeeping performance; General strength and structure design; Moor-ing system; Station keeping; Spread mooring; Method of Analysis; Environ-ment data; Wind, wave, current; Water depth; Soil and sea floor conditions; Atmospheric icing; Marine growth; Basic considerations of environmental load. Dynamic positioning; Wind forces and moment; Mean wave drift forces and moment; Capability plot of DP system.

Lecture 7: Structural Response I
Design of beam columns, elastic and in-elastic response. Johnston's formula for in-elastic columns. Perry Robertson's equation design guideline, codified rules.

Lecture 8: Structural Response II
Standards and guidelines; Stiffened plated structure Buckling & post buckling of unstiffened plates, Ultimate strength of stiffened plate, com-bined loading under axial & lateral load, Design codes API RP 2V, DNV- RPC201, Example problems.

Lecture 9: Structural Response III
Standards and guidelines; Stiffened shells; Elastic and inelastic buckling of unstiffened & stiffened shells under axial, hydrostatic & combined load-ing; Design codes API RP 2U, DNV- RP-C202; Example Problems

Lecture 11: Tanker Based FPSOs
Layout and General arrangement, Tank conversion, Longitudinal Strength characteristics, Tank design and arrangement, Design principles, Limit states, probability safety factor.

Lecture 12: Tutorials on Stiffened Shells and Hull Girders
Examples based on Elastic and inelastic buckling of unstiffened & stiff-ened shells under axial, hydrostatic & combined loading following DNV code. Examples on Hull Girder Strength will also be dealt with.