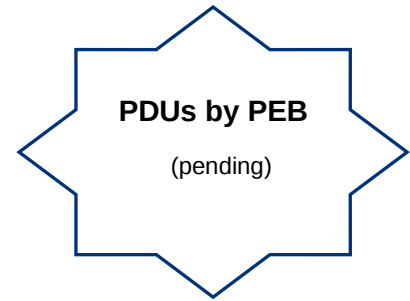




Short Course

On

Coastal Engineering Application: Wave Hindcasting and Wave Propagation in Shallow Water

Date, Time, Duration and Venue

3-4 July 2024 (Wednesday and Thursday)
NTU CEE Seminar Room B (N1-B1b-16)

Programme Fee: \$1000/ pax
 \$750/ pax (NTU Alumni)
 Fees inclusive of prevailing GST

For Whom

Engineers, Consultants and Contractors

Course Instructors



Dr Tan Soon Keat (NTU)



Dr Adrian Lai (SJ)

Organised by:

Centre for Urban Solutions (CUS)
School of Civil and Environmental
Engineering (CEE)
College of Engineering
Nanyang Technological University
Singapore 639798

Surbana Jurong Campus
38 Cleantech Loop, #01-31
Singapore 636741

~~~ COURSE OBJECTIVE ~~~

This course is intended to introduce the general principles and considerations of wind-generated waves for coastal engineering applications. The sea environment can be extreme and unpredictable just like the weather hence its loading and analysis have important implications in coastal engineering applications. Wind, waves, tidal currents and sea levels, seabed bathymetry, scour and littoral transport are some important design considerations which affect site selection, structural layout of the engineering applications, etc. Waves in general, are by far the more important (if not the most important) factor and complex to deal with. This course begins with the introduction of various parameters, function and terminology used in the description of wind-generated waves

and includes some simple wave mechanics and prediction, design wave height parameters and analysis together with design water level, which may be used for design considerations in coastal engineering applications. Some hands-on exercises are included. Examples of coastal engineering applications will be deliberated.

~~~ COURSE OUTLINE ~~~

The course will be conducted in 8 sessions of 2-hour duration each.

Sessions 1, 2, 3 & 4 (3 July am & pm)

Analysis of design wave heights (8.0 hr)

Introduction of wave motion. Concept of significant wave height. Energy and directional spectra. Wind wave generation. Wave hindcasting from known wind fields. Estimation of extreme wave height and period. Hands on exercises.

Sessions 5 & 6 (4 July - am)

Wave mechanics and transformation (4.0 hr)

Introduction of wave mechanics and shoaling. Wave transformation: refraction, diffraction, reflection. Linear random waves. Hands on exercises.

Session 7 & 8 (4 July – pm) 4.0 hr

Examples of wave analysis in engineering applications.



Course Registration Link:

https://wis.ntu.edu.sg/pls/webex/e88/REGISTER_NTU.REGISTE R?EVENT_ID=OA24052414230627

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9868 5130

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~~~ ABOUT THE INSTRUCTORS ~~~

Dr Tan Soon Keat (NTU)

Dr Tan retired from Nanyang Technological University in 2023 after spending more than 3 decades in the School of Civil and Environmental Engineering. He is now a consultant and trainer in engineering applications including hydraulic design, water resources engineering, sediment transport and coastal engineering. Dr Tan conducts numerical and physical model studies for hydraulic systems related to river training, coastal defence, intake and outfall, pumping stations, pipe network, as well as dispersion and diffusion in the surface and subsurface water. Dr Tan also conducts training and executive workshops for senior officers and professional engineers in hydraulics, water resources engineering and coastal engineering. At the national level, Dr Tan had served as a member of the drainage design review panel for the Ministry of Environment and Water Resources, Singapore, and a resource specialist in the panel of the GPC MND/MEWR/NEA Panel for Singapore. Dr Tan's interests include the application of geographical information system (GIS) in water resources, numerical simulation for hydraulics, hydrodynamics, coastal engineering applications, climate change and sustainable developments. His recent works include hydrodynamic consideration of mega underwater structures, application of wetland technologies in the removal of pharmaceutical products from wastewater streams and impact of climate change on urban drainage ancillary, assets, and critical infrastructures. Currently Dr Tan is involved in projects related to the impact of climate change, water resources, hydraulics, and coastal engineering applications; He also conducts executive courses in civil engineering applications and delivering seminars on his specialised fields. He also holds directorships of several enterprises.

Dr Adrian Lai

Dr. Adrian Lai is currently a Principal Coastal Engineer in Surbana Jurong. Prior to joining the industry, he had spent over 10 years in the academia focusing primarily in environmental fluid mechanics problems such as multiple jets/plumes outfall discharges and two-phase sediment plumes dispersion. Several original and novel mathematical models of jets/plumes were developed during his research career. In particular, the modelling of a rosette buoyant jet group from an ocean outfall was awarded the Karl Emil Hilgard Hydraulic Prize in 2013 by the American Society of Civil Engineers. He is also experienced in computational fluid dynamics (CFD) simulation of environmental fluid mechanics problems such as desalination brine discharge and sediment dumping. Currently, he has over 5 years of numerical coastal modelling experiences in a commercial consulting environment, including MetOcean studies, coastal protection designs, and EIA studies for various projects. He is familiar with programming languages MATLAB and Python, various numerical coastal and inland modelling tools such as the MIKE software package (MIKE21, MIKE3, ECOLab, MIKE Hydro River, FEFLOW), as well as Deltares' modelling software (Delft3D FM – D-Flow, D-Waves, D-Morphology, D-Water quality, XBeach), from which the hydrodynamics, waves, water quality, and sediment transport of an area of interest can be determined. He is also experienced in the application of CFD to engineering problems and developed near-far field coupling of ocean outfall discharge using CFD for near-field and MIKE3 for far-field simulation of the discharge.