

DRAFT

Ocean Engineering Summer School

Supported by
Nippon Foundation Ocean Innovation
Consortium

14 August - 08 September 2023

Version 1, dated 15 March 2023



Norwegian University of
Science and Technology

Department of Marine Technology
Norwegian University of Science and Technology
NO-7491, Trondheim, Norway



Summer School Team at NTNU

School coordinator and contact person: Professor Amir Nejad



Prof. Sverre Steen



Prof. Amir Nejad



Prof. Svein Sævik



Prof. Martin
Ludvigsen



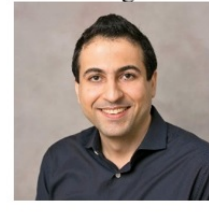
Prof. Erin Bachynski-
Polić



Prof. Pål Lader



Associate Prof.
David Kristiansen



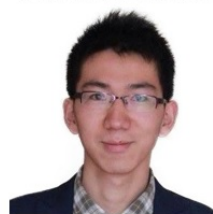
Prof. Mehdi Zadeh



Prof. Bernt Leira



Associate Prof.
David Emberson



Associate Prof.
Zhaolong Yu



Prof. Lars Erik
Holmedal

The summer school is also supported by PhD and MSc students and administrations at Marine Technology Department, and invited guest lecturers from the industry.

1. Introduction

The Nippon Foundation Ocean Engineering summer school was started at NTNU in 2017 with the aim to support the Nippon Foundation Ocean Innovation Consortium in marine resource development ¹. The summer school especially addresses ocean engineering topics relevant for the offshore energy industry, food production (aquaculture), green transportation, electrical ship, autonomous ship, and subsea engineering. It is expected that the students in this school have a general understanding in naval architecture or ocean engineering. The main aim of the summer school is to provide an extension of naval architecture technology into ocean engineering through:

- 1- Basic disciplines: design of marine structures, stability of floating bodies, hydrodynamics and control of ocean structures
- 2- Design of floating platforms for drilling operations and oil and gas production
- 3- Design and analysis of risers, pipelines and subsea facilities
- 4- Design and operation of AUV and ROV, autonomous vessels
- 5- Design and analysis of floating wind turbines, marine operations
- 6- Green shipping, hybrid systems and alternative fuels

2. Training approach

The summer school is formed based on the team works and team activities. It includes: lectures, demonstration of industrial examples and numerical simulations, software practices, visit of related industries through field visits and excursions, lab visits, practical exercise at simulation center, guided self-study, team works, project work and presentation. There is an individual and team exercise/assessment at the end of each week and project presentation at the end of the school which is used in the final evaluation. In addition, several cultural activities are included during the school program.

3. Schedule

Week	Period	Topic
1	14.08-18.08	Introduction, Marine Structures
2	21.08-25.08	Offshore Wind Technology
3	28.08-01.09	Marine Industry in Norway
4	04.09-08.09	Subsea Engineering

¹More information about the summer school and the training approach can be found here: Nejad, Amir R., Yuriko Aoyanagi, and Michaela Ibrion. "Team and Research Based Learning Methods applied in multidisciplinary marine engineering education." *Journal of Physics: Conference Series*. Vol. 1357. No. 1. 2019. <http://doi.org/10.1088/1742-6596/1357/1/012039>

Week 1: Introduction, Marine Structures		
Date	Morning (9:15-12:00)	Afternoon (13:15-16:00)
14.08	Welcome session, introduction to ocean space, sea of opportunities, <i>Sverre Steen, Amir Nejad</i>	Insights of Norwegian culture, <i>Guest lecture</i>
15.08	Short course on presentation skills, <i>Guest lecture</i>	Marine structures design principles, <i>Bernt Leira</i>
16.08	Hydrodynamic fundamentals, <i>David Kristiansen</i>	Hydrodynamic fundamentals, <i>Lars Erik Holmedal</i>
17.08	Marine dynamics fundamentals, <i>Zhao-long Yu</i>	Aquaculture, <i>Pål Lader</i>
18.08	Travel to Røros, (by train, 09:22-11:53)	Week1 summary: group presentations and assessment, <i>Amir Nejad</i>
19.08	Røros	Røros (return 16:30-18:56)
20.08	weekend, self study	weekend, self study

Welcome dinner, meeting the NTNU team on Monday 14 August, 17:30-20:00

Week 2: Offshore Wind Technology		
Date	Morning (9:15-12:00)	Afternoon (13:15-16:00)
21.08	Offshore wind turbine: introduction, <i>Guest lecture</i>	Model test, visit of SINTEF Ocean labs, <i>Sverre Steen</i>
22.08	Offshore wind turbine: integrated analysis, <i>Erin Bachynski-Polić</i>	Offshore wind turbine: response analysis and exercises, <i>Erin Bachynski-Polić</i>
23.08	Visiting Fossen wind farm	Visiting Fossen wind farm
24.08	Introduction to digital twin, <i>Amir Nejad</i>	Presentation by PhD students on offshore wind
25.08	Week2 summary: group presentations and assessment, <i>Amir Nejad</i>	Travel to Bergen (15:20, 16:20)
26.08	Bergen	Bergen
27.08	Bergen	Bergen

Visiting Nor-Fishing, meeting Japanese industry attending Nor-Fishing on 21 August

Week 3: Marine Industry in Norway		
Date	Morning (9:15-12:00)	Afternoon (13:15-16:00)
28.08	Visiting Equinor Bergen	Visiting Equinor Bergen
29.08	Visiting industry Bergen	Return to Trondheim (18:40-19:40)
30.08	Green shipping, hybrid, <i>Mehdi Zadeh</i>	Visiting NTNU autonomous pilot ferry <i>Mehdi Zadeh</i>
31.08	Design and operation of underwater vehicles (ROV, AUV), <i>Martin Ludvigsen</i>	AUR Lab visit, excursion with NTNU research vessel Gunnerus, <i>Martin Ludvigsen</i>
01.09	Green shipping, alternative fuels, <i>David Emberson</i>	Week3 summary: group presentations and assessment, <i>Amir Nejad</i>
02.09	Trondheim Marathon (we recommend joining 5 km only)	lunch after the Marathon
03.09	weekend, self study	weekend, self study

Tour in the forest, visit of lakes, Estenstadhytta on 30 August

Week 4: Subsea Engineering		
Date	Morning (9:15-12:00)	Afternoon (13:15-16:00)
04.09	Guest lecture Marine Operations	Guest lecture on autonomous ship
05.09	Design of risers, pipelines and umbilical, <i>Svein Sævik</i>	Design of risers, pipelines and umbilical (exercise)
06.09	Guest lecture, lessons from failures in marine industry	Week4 summary: group presentations and assessment, <i>Amir Nejad</i>
07.09	Self study, project preparation	Self study, project preparation
08.09	Individual Presentations	Individual Presentations, closing session, dinner
09.09		
10.09		

Summer School Closing Dinner on 8 Sep. at 18:00

4. Travel, accommodation and venue

Travel information:

If you arrive in Norway in Oslo or other cities than Trondheim, you must collect your luggage and pass through the customs and check-in again, your luggage will NOT be transferred for domestic flight even if you use the same airline. Ask your airline or airport staff for more information.

Lecturing location:

Marine Technology Department, Jonsvannsveien 82, 7050 Trondheim (Nearest bus station: Østre Berg 2)

Accommodation: “Trondheim Leilighetshotell”

Address: Gardemoens gate 1, NO-7066 Trondheim.

How to get to the hotel: by bus from the airport, leave at the “Rønningsbakken” station and walk to the hotel apartment. By train from the airport, leave at “Lilleby stasjon” which is just in front of the hotel apartment.

For check-in show your passport at the reception and mention NTNU Summer School to collect your key. This is a hotel apartment, and you will be having a fully equipped kitchen with refrigerator, oven, and microwave, dishwasher, plus 55” Smart TV with about 40 channels, washing machine, and free Wi-Fi in each apartment. Everyone will have his/her own room in each apartment. You can check-in from Saturday 12 August and the last day of check-out is 11 September.

Gift card

You will receive a gift card for a nearby shopping center, “City Lade”, located at Haakon VII's gt. 9, 7041 Trondheim. There are several cloth shops, supermarket, restaurants, etc. at City Lade and the gift card can be used in any of them.

Transport

You will receive a AtB bus card valid for one month for zone A in Trondheim for unlimited number of travels. AtB is the bus service company in Trondheim: <https://www.atb.no/en/>

Clothing

Visiting beautiful Norwegian mountains and Trondheim Marathon are part of the summer school activities. Be prepared and take appropriate shoes and rain clothes with you. Follow weather forecast from: <http://www.yr.no>

Emergency numbers

Prof. Amir Nejad: 0047 941 80 125 (also on “Line” in case of emergency)

Taxi in Trondheim: 07373 or 08000, Ambulance: 113, Fire: 110, Police: 112



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