PIANC/Marine Civil Engineering Day 27. May 2017

Marine Civil Engineering specialization - courses

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Contents

Marine Civil Engineering brief

Department of Civil and Environmental Engineering (IBM)
Faculty of Engineering Science (IV)

Study Programmes:

Norwegian Master in Civil and Environmental Engineering
5 year track
2 year track

Nordic Master in Cold Climate Engineering (NMCCE)

European Master in Coastal and Marine Engineering and Management (CoMEM)

Marine Civil Engineering brief

Design and construction of infrastructure in coastal and near coastal waters

What we do (i):

- Modelling of the Arctic and Coastal Marine Environment
  - Wind, Waves, Currents, Tides, Sediment transport and Ice
  - Numerical and laboratory modelling
  - Statistical analysis
- Marine hydrodynamics - CFD
  - Wave and wave forces modelling
  - Flow-structure interaction
- Finding solutions to Arctic challenges
  - Sea ice, Ice mechanics, Coastal erosion, Floaters in Ice, Ice management, Data collection

Marine Civil Engineering brief

Design and construction of infrastructure in coastal and near coastal waters

What we do (ii):

- Renewable energy
  - Offshore wind turbines optimal design
  - Tidal and wave power
- Designing port and harbour facilities
  - Port structures design (Breakwaters (molos), Quays etc)
  - Port approach and fairways design
  - Planning of dredging and disposal of contaminated sediments

Marine Civil Engineering

Two fields of study and three fields of specializations

The two fields of study at IBM

(to be chosen by the students by may 15th in 4th semester)

- Structural Engineering (Konstruksjonsteknikk (K))
- Building and Construction Engineering (Bygg og anleggsteknikk (BA))

The three specializations of the MCE profile

(Main Profile MCE to be chosen by the students by June 1st in 8th semester)

- Arctic Marine and Cold Climate Engineering
- Offshore Wind Energy Turbine Design
- Maritime Coast and Port Infrastructure

Courses given by the MCE group

BSc-level:

- Hydrodynamics for Civil Engineers basic course (50 %) (Semester 4)

MSc-level:

- Arctic and Marine Civil Engineering (semester 5 or 7)
- Coastal Engineering (semester 6 or 8)
- Port and Coastal Facilities (semester 7 or 9)
- Dynamic Response to Irregular Loadings (semester 7 or 9)
- Ice Actions on Arctic Structures (semester 7 or 9)

PhD level

- Ice mechanics
- Advanced Topics in Port and Coastal Engineering
- Wind Turbine Design

Course combinations

The MCE courses need to be combined with courses from other main profiles

A graduate in MCE will have:

- A broad and good foundation for developing and designing facilities and/or constructions both offshore and along the coast.
- Skills in applying state of the art numerical tools in the field of her/his study
- The ability to collect and analyze relevant environmental data with emphasis on sustainable design (extremes, climate change impacts etc.)

Course overview – Marine Civil Engineering graduate

Semester 1

BM1 Building materials
Information technology, BC
Mathematics 1
Chemistry

Semester 2

Exam philosophicum
Mechanics 1
Mathematics 2
BM2 Water and Environment

Semester 3

BM3 Infrastructure
Mechanics 2
Mathematics 3
Statistics

Semester 4

Geotechnics og geology
BM4 Design of Buildings and Structures
Physics
Hydromechanics

Semester 5

MCE suggestions

Course	#	CP	AC	WE
Mathematics 4N	O	K/BA	K/BA	K
Arctic and Marine Civil Engineering	VB	K/BA	K/BA	K	K
Mechanics 3	VA	K	K	K
Steel Structures 1	VA	K	K	K
Organization and Economy in Building and Construction Projects	VA	BA	BA	
Engineering Geology, Basic Course	VA	BA	BA	
Aspects of Structural Safety	VA			
Geographic Information Handling 1, BC	VB			

O – compulsory

VA – elective and mutually collision free , VB – elective, but not collision free.

CP – Maritime Coast and Port Infrastructure; AC – Arctic Marine and Cold Climate; WE – Offshore Wind Energy Turbine Design

Semester 6

MCE suggestions

Course	#	CP	AC	WE
Technology Management	O	BA/K	BA/K	K
Coastal Engineering **(**also offered in sem. 8)	VB	BA/K	BA/K	
Geotechnics, Design Methods	VA	BA/K	BA/K	K
Structural Mech.- Computational Methods	VA			K
Concrete Structures 1	VA	K	BA/K	
Production Management in Building and Construction Projects	VA	BA		
Numerical Methods	VA			K
Project Planning and Control	VB			

CP – Maritime Coast and Port Infrastructure; AC – Arctic Marine and Cold Climate; WE – Offshore Wind Energy Turbine Design

Semester 7

MCE suggestions

Course	#	CP	AC	WE
Complementary course (K-emne)	O	K/BA	K/BA	K
Geotechnics, Field and Lab.	VA	K*/BA	K*/BA	
Dynamic Response to Irregular Loadings	VA	K*	K*	K
Finite Element Methods in Strength Anal.	VA			K
Steel Structures 2	VA			K
Fracture Mechanics	VA			
Arctic Offshore Engineering	*VB*	*	*	
Port and Coastal Facilities	VB	BA/K	BA/K	
Construction Engineering	VB	BA	BA	
Concrete Structures 2	VA			
Project Planning and Analysis	VB			
Ice Actions on Arctic Structures	VB			
Geohazards and Risk Analysis	VB			
Fatigue Design	VB			

CP – Maritime Coast and Port Infrastructure; AC – Arctic Marine and Cold Climate; WE – Offshore Wind Energy Turbine Design

Semester 8

MCE suggestions

Course	#	CP	AC	WE
Experts in Team	O	K/BA	K/BA	K
Coastal Engineering (if not taken i 3.year)	VB	BA/K*	BA/K*	
Foundations and Slopes	VA	K		K
Materials Mechanics	VA		K	K
Structural Dynamics	VA		K	K
Concrete Technology	VA	K	K/BA	
Frozen Ground Engineering Arctic	*VB*		*	
Ice Mechanics, Loads on Structures & Instr..	*VB*		*	
Cold Regions Field Investigations	*VB*		*	
Building Design Management	VA	BA	BA	
Production Management in Building and Construction Project**s**	VA	BA		
Engineering Geology of Rocks, AC	VB			
Engineering Geology of Soils, AC	VB			
Finite Element Methods in Eng. Science	VB			

CP – Maritime Coast and Port Infrastructure; AC – Arctic Marine and Cold Climate; WE – Offshore Wind Energy Turbine Design

Semester 9 - specialization

Course	#	CP	AC	WE
Marine Civil Engineering, Spec. Pr.	na	X	X	X
Marine Civil Engineering, Spec. C.	VB	X	X	X
One Complementary course*	VB	X	X	X
One specialization Completion course*	VB	X	X	X

* Choose one course from a list of non-technologial courses.

** Any of the semester 7 recommended courses not already taken,
or any of the 9th semester Spec. courses

All choices in agreement with professor in charge for the specialization project.

5. year spring

TBA4920 Marine Civil Engineering, Master's Thesis 30

LINK: http://folk.ntnu.no/oivarn/TBA4550/Project-MarineCivilEngineering_overview.pdf

http://folk.ntnu.no/oivarn/TBA4550/Project-MarineCivilEngineering_overview.pdf

MCE at IBM

Opportunites have been shown for students in

- Structural Engineering
- Building and Construction Engineering

- Maritime Coast and Port Infrastructure and in Arctic Marine and Cold Climate should be of interest for students in both fields of studies

- Offshore Wind Energy Turbine Design is however designend for students in Structural Engineering field of study