

# Arctic Offshore Engineering Course Agenda

## Day 1:

Lecturers: Ken Croasdale (KRCA) and Rocky Taylor (CARD)

**ICE MECHANICS: ICE FORMATION; ICE FEATURES: DATA REQUIREMENTS (CODES);  
DATA SOURCES; INTRODUCTION TO PLATFORMS IN ICE.**

Time	No.	Topic
8:30 - 8:45	1.0	Housekeeping, safety and introductions. General Introduction to the course (15min)
8:45-9:25	1.1	General introduction to ice engineering (40min)
9:25 -10:20	1.2	Ice formation, properties & sea ice features (morphology) (55min)
10:20 – 10:35		Coffee Break
10.35 – 11.00	1.3	Industry codes & standards applicable to Arctic Structures –emphasis on ice data & platform requirements. (25min)
11.00 – 11.35	1.4	Sources of sea ice and iceberg data, data applicability and limitations (35min)
11:35 – 12:20	1.5	Data acquisition on sea ice features (methods & technologies) (45min)
12:20-13:10		Lunch (50m)
13:10-13:30	1.6	Industry experience with fixed platforms in ice (20min)
13:30 - 14:15	1.7	Types of structures with principle features/advantages of each (45min)
14.15 – 15.00	1.8	Fixed platforms operations in ice and construction issues (45min)
15:00 -15.15		Coffee Break
15.15 – 17:00	1.9	Group exercise and discussion

# Arctic Offshore Engineering Course Agenda

## Day 2 (Morning)

Lecturers : Mike Paulin (IntecSea) and Ryan Philips (C-CORE)

### ARCTIC PIPELINES with special consideration for ice gouging and burial protection

Time	No.	Topic
8.20 – 8.30	2.0	Housekeeping, safety and introductions
8:30 – 9:00	2.1	Overview of Arctic Offshore Pipeline Projects (30min)
9:00 – 10:00	2.2	Arctic Offshore Pipeline Design (60min)
10:00– 10:15		Coffee Break
10:15-11:15	2.3	Pipe Design with consideration for ice keel / seabed gouging (60min)
11.15 – 11.45	2.4	Arctic Offshore pipeline construction, installation, maintenance, repair, detection issues (30min)
11:45 – 12:15	2.5	Discussion
12:15 – 13:00		LUNCH

## Day 2 (Afternoon)

Lecturer: Ken Croasdale (KRCA)

### ICE INTERACTION & LOADS 1

Time	No.	Topic
13:00 -13:45	2.6	Industry codes & standards applicable to Arctic Structures -( reliability and ice loads) (45min)
13:45 – 14:45	2.7	General ice load design philosophy & methodologies with lead into vertical structures (60min)
14:45 – 15.00		Coffee Break
15:00-15:40	2.8	First year ridge loads on vertical structures (40min)
15:40 – 16:00	2.9	Cyclic ice loads & ice induced vibration (20min)
16:00 – 16:20	2.10	Local ice loads (20min)
16.20 – 17.15	2.11	Group exercise and discussion

# Arctic Offshore Engineering Course Agenda

## Day 3 (Morning)

Lecturer : Ken Croasdale

### ICE INTERACTION & LOADS 2

Time	No.	Topic
8.20 –8.30	3.0	Housekeeping, safety and introductions
8:30 –9:20	3.1	Sea ice loads on sloping structures (Global; deterministic) (50min)
9:20 – 9:40	3.2	Low freeboard and shallow water (20min)
9:40 – 10:00	3.3	Ice model testing: basic technique & scaling considerations (20min)
10:00 -10-15		COFFEE
10:15 – 10:35	3.4	Structure instrumentation (20min)
10:35 – 11:00	3.5	Ice Loads on floaters (adaptation of methods from fixed platforms) (25min)
11:00 – 12:00	3.6	Exercise and discussion on deterministic loads (60min)
<b>12:30 – 13:00</b>		<b>LUNCH</b>

## Day 3 (Afternoon)

Lecturers : Rocky Taylor (CARD), Mark Fuglem (C-CORE) and  
Pat Barron (Iceberg Logistics)

### PROBABILISTIC ICEBERGS AND SEA ICE LOADS, & ICEBERG MANAGEMENT

Time	No.	Topic
13:00 – 13:20	3.7	Risk-based design and probabilistic modeling (20 min)
13:20 – 14:05	3.8	Probabilistic global iceberg and ice island impact loads (with ILS) (45 min)
14:05 – 14.50	3.9	Probabilistic global sea ice loads (with SILS) (45 min)
14:50 – 15:10	3.10	Probabilistic local ice pressure analysis (with examples) (20 min)
15:10 – 15:25		BREAK
15:25 – 16:10	3.11	History of floating operations in iceberg regions (45min)
16:10 – 16:55	3.12	Iceberg management philosophy and techniques (45min)
16:55 – 17:15		Discussion (15min)

# Arctic Offshore Engineering Course Agenda

## Day 4

Lecturers: Arno Keinonen and Evan Martin (AKAC)

### FLOATING STRUCTURES IN SEA ICE AND ICE BREAKING SHIPS.

Time	No.	Topic
8.20 – 8.30	4.0	Housekeeping, safety and introductions
8.30 – 9.05	4.1	History of Arctic Transportation (35min)
9.05 – 9.40	4.2	History of Arctic Offshore (35min)
9:40 - 10:20	4.3	Introduction to Arctic Transportation Operations (35min)
10.20 – 10.30		Coffee Break
10:35 - 11:15	4.4	Introduction to Station Keeping Operations (35min)
11.15 - 11.55	4.5	Development and Design of Vessels for Ice (50min)
<b>11.55 - 12:45</b>		<b>Lunch</b>
12:45 -13:25	4.6	Vessel Performance in Ice (35min)
13:25 – 14:05	4.7	Vessel Safety in Ice (20min)
14:05 – 14.25	4.8	Port, Terminal, and Transportation Systems (20min)
14.25-15.05	4.9	Model & Full Scale Testing (20min)
15.05 – 15.20		Coffee break
15.20 – 17.00	4.10	Exercise (40min)

# Arctic Offshore Engineering Course Agenda

## Day 5

Lecturers: Mark Kapfer (C-CORE), Pradeep Bobby (C-CORE)

Kelley Dodge (C-CORE)

Remote Sensing and Drift forecasting: Closing Session

Time	No.	Topic
8.20 – 8.30	5.0	Housekeeping, safety and introductions
8:30 - 9:00	5.1	Principles of Remote Sensing (30min)
9:00 – 10:00	5.2	Sea Ice Charting (Includes Egg Codes and drift forecasting) (60min)
10:00– 10:15		COFFEE
10:15-11:00	5.3	Iceberg Charting (45min)
11.00 – 12:00	5.4	Satellite case studies/practical planning example/exercise (60min)
12:00 – 12:30		LUNCH
<b>12:30 - 1:00</b>		<b>Closing Session Possible Tour</b>