



Aalto University
School of Engineering

MEC-E2009 Marine Risks and Safety

Introduction

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Aalto University, Marine Technology

Why a course in maritime risks and safety?

Maritime accidents are complex events

Maritime accidents cause loss of life, damage to the environment, and economic costs



Some of the accidents brought historical catastrophes



Components of Marine Technology

Maritime Traffic Context (Ecosystem)

Ship

Technical/Design



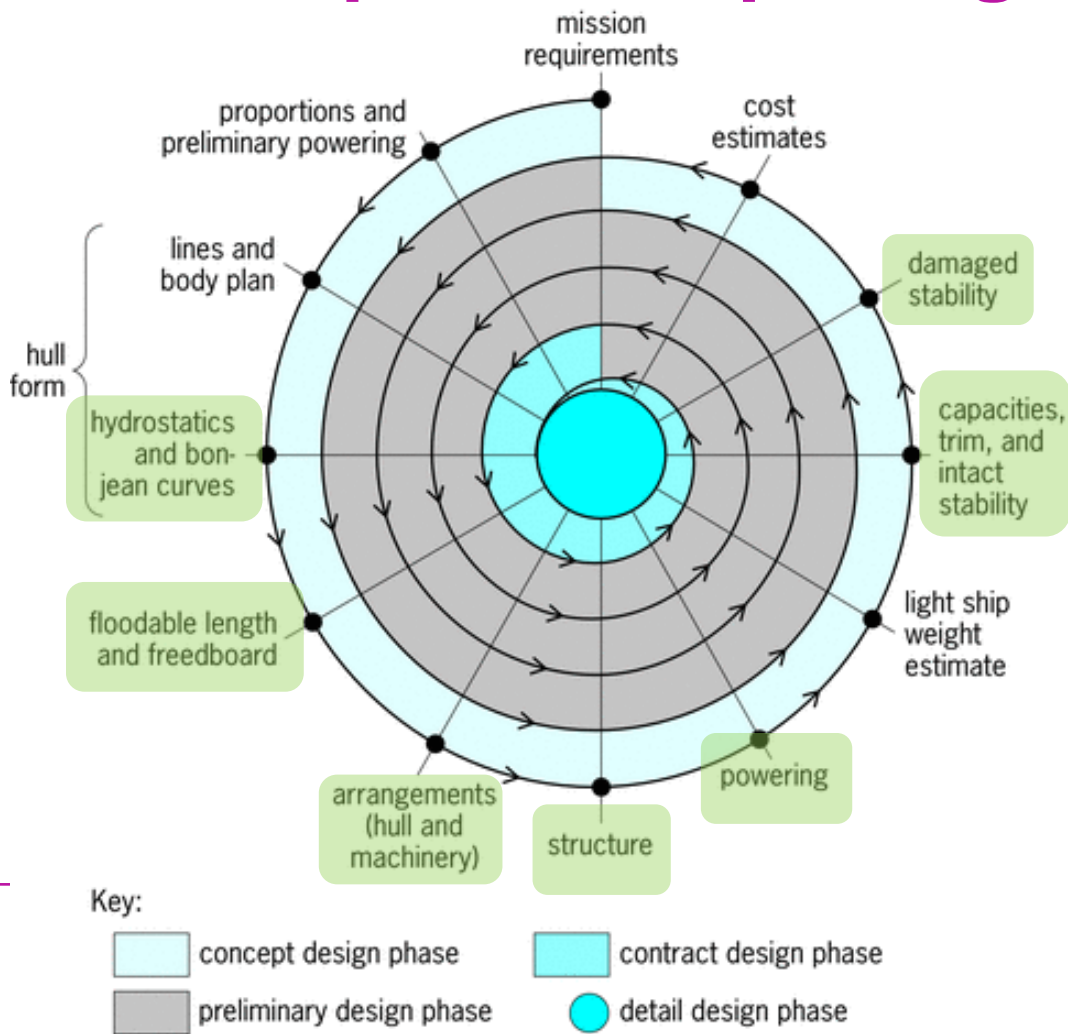
Operational



Safety is a fundamental aspect of ship design

Ship design spiral

SAFETY



... and a key concern in ship operation

SITE SAFETY



Hard Hats
Must Be Worn



High Visibility Vest
Must Be Worn



Eye Protection
Must Be Worn



Foot Protection
Must Be Worn



Course objectives

- Students understands the basic concepts of engineering risk and safety in the maritime context.
- Can explain the overall maritime safety regulatory regime and describe the contents of the main regulatory approaches to manage maritime risk and safety.
- Can identify and explain methods for hazard identification, risk analysis and safety engineering.
- Can select and apply appropriate methods for a particular problem related to ship design, ship operation or safety of maritime transportation

Course schedule

Lectures

Date	Topic	Lecturer
06.09	L1: Introduction, accidents, rules and regulations	Osiris Valdez Banda
12.09	L2: Introduction to reliability theory, classic accident modeling theories and hazard analysis methods	Ahmad Bahoo Toroody; Osiris Valdez Banda
19.09	L3: System Safety Engineering, STAMP, STPA and CAST	Osiris Valdez Banda
26.09	L4: Risk- and goal-based ship design	Martin Bergström
03.10	L5: Arctic Shipping and Pollution Prevention and Response?	Floris Goerlandt; Osiris Valdez Banda
10.10	L6: Workshop and presentation of the final assignment*	Osiris Valdez Banda

**Lectures cover each topic. Some lectures rely on prior reading.
Deeper understanding through complementary and extra materials on MyCourses**

Lectures*

*** Lectures L2 and L3 contain the main topics of the assignment. Reading and working in advance will be very beneficial**

**** Lecture L6 is a workshop for the presentation of the course assignment. Instructions for the workshop will be given in L4 and L5**

Assignments

No.	Topic	Timing	Duration
1	Classic modelling technique vs STPA hazard analysis (ship accident case)	1 week (week)	6 weeks
2	Learning logs	every week	1 week (x5)

- The assignment will be posted to MyCourses (including the reading material) by Friday 8.9.2023
- Assignment will be introduced in details during Lecture 2
- Learning logs instructions are available via Mycourses.
- **Learning philosophy:** problem-based learning and reflection

Exam (important)

- **Date:** 16 October 2023
- **Time:** 13:00-16:00
- **Place: room 326**
- Exam covers all content from the lectures.
Also the complementary study materials “CM” (articles, texts) given online on MyCourses are covered in the exam.
Materials listed as extra reading “EM” are to deepen or widen understanding but are not in exam as such.
- Questions will be in line with intended learning outcomes.
Focus on gaining knowledge and understanding.
- **HOWEVER**, in every lecture we will have a fast quiz that can count to either get points for the final exam or to get the actual total points of the exam

Fast Quiz

- At the end of each lecture, you will have a fast quiz covering the contents covered in the lecture.
- The fast quiz will contain questions that lead to a grade for the quiz that will be calculated as the weight for the final exam. How:

Student		FQ					Weight					
ID	Name	FQ1	FQ2	FQ3	FQ4	FQ5	FQ1	FQ2	FQ3	FQ4	FQ5	TOTAL
XXXXX	Last name, Name	10	2	3,5	4,5	5,5	0,15	0,25	0,25	0,2	0,15	56

Min	Max	Grade
0	50	0
50	60	1
60	70	2
70	80	3
80	90	4
90	100	5

Course grading

- Scale 1 (pass) – 5 (excellent)
- Calculation basis:
 - 45% “exam and/or fast quizzes”
 - 40% assignment
 - 15% learning logs and feedback

Course staff 2023



Osiris Valdez Banda, D.Sc. (Tech)

Assistant Professor

Teaching

- Main course responsible
- Lecture L1, L3 and L6
- Exam
- Contact
 - Present at each lecture*
 - osiris.valdez.banda@aalto.fi

Research interests

- Risk analysis
- Systems safety and resilience engineering
- Safety management and modelling
- Smart shipping
- Winter navigation



Victor Bolbot

Course assistant

Contact

- Questions and instructions for the assignment
- Any other practicality about the course
- Contact
 - victor.bolbot@aalto.fi

Teaching

- Lecture L2
- Contact
 - Present at all "lectures"

Research interests

- Safety of Smart shipping
- Risk analysis
- Ship design
- Maritime cybersecurity



Martin Bergström, PhD

Guest lecturer (DLR Germany)

Teaching

- Lecture L4
- Contact
 - Present at L4
 - Contact only regarding L4
 - martin.bergstrom@aalto.fi

Research interests

- Risk- and goal-based ship design
- Arctic shipping
- Winter navigation



Floris Goerlandt, D.Sc. (Tech) Professor at Dalhousie University

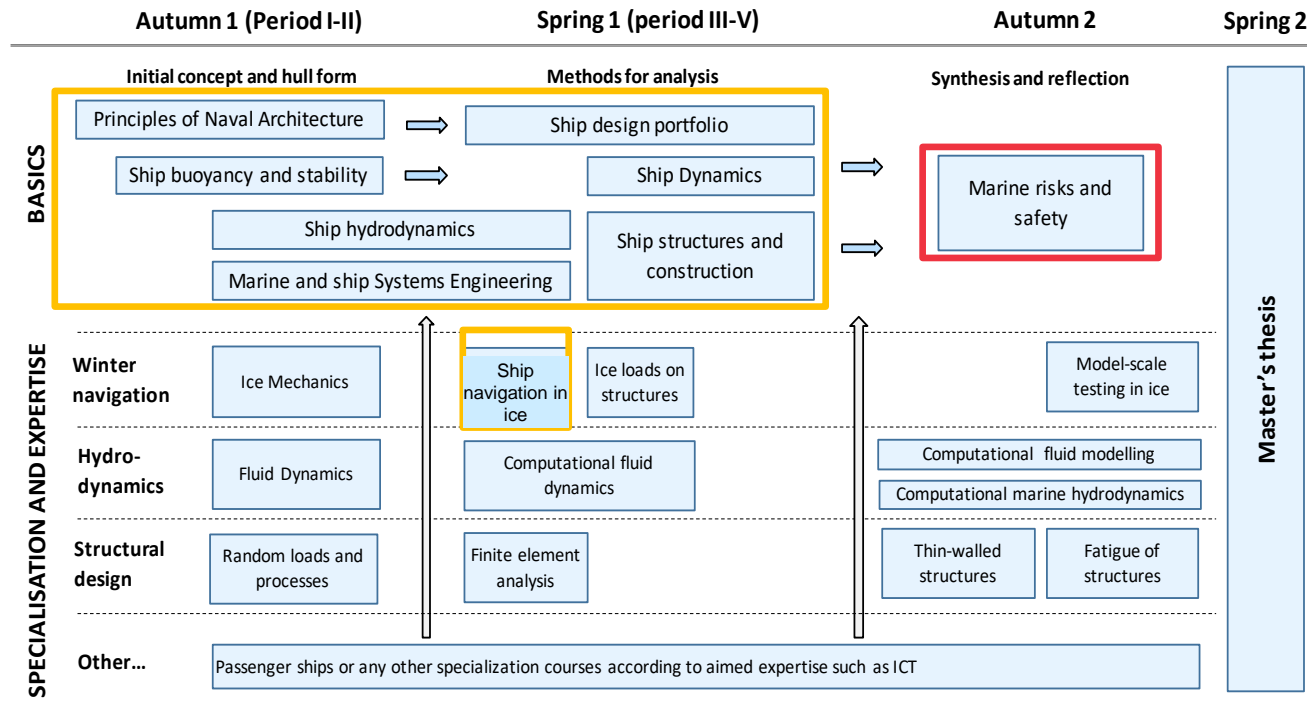
Teaching

- Lecture L5
- Contact
 - Contact only regarding L5
 - floris.goerlandt@dal.ca

Research interests

- Maritime waterway risk management
- Design of tools for enhancing maritime safety
- Safety of arctic navigation
- Uncertainty analysis
- Validation of risk analysis

MEC-E2009 Marine Risks and Safety in Marine Technology



Common studies and other supportive courses are selected based on the study path and student's interest

More courses in MEC about safety:

MEC-E3004 Safety Management in Complex Sociotechnical Systems

MEC-E6003 Materials Safety