MEC-E2009 Marine Risks and Safety

Introduction

Osiris A. Valdez Banda, D.Sc. (Tech)

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

Prestige 13.11.2002

Some of the accidents brought historical catastrophes
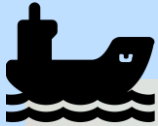
Components of Marine Technology

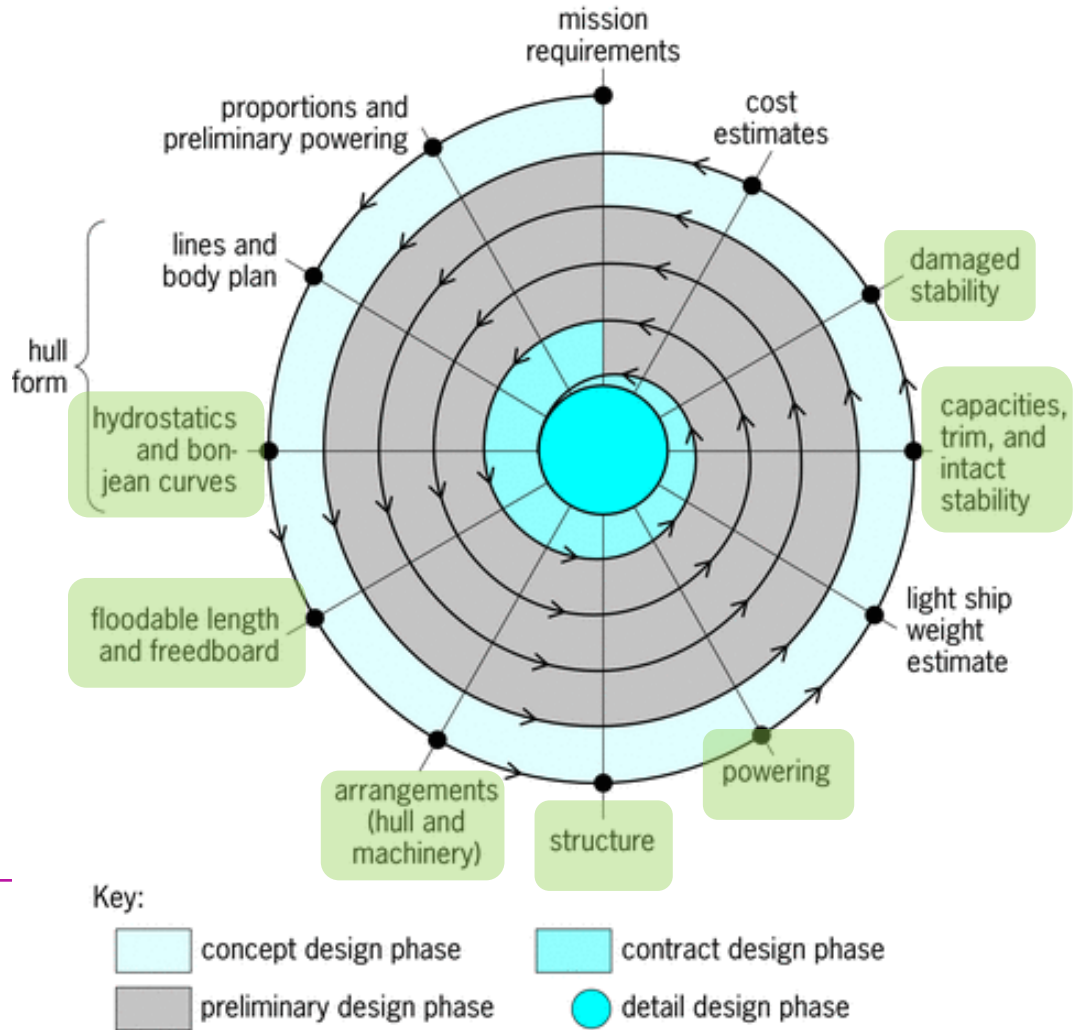Maritime Traffic Context (Ecosystem)

Ship

Technical/Design

Operational

Safety is a fundamental aspect of ship design

Ship design spiral

SAFETY

mission requirements

cost estimates

proportions and preliminary powering

damaged stability

lines and body plan

hull form

capacities, trim, and intact stability

hydrostatics and bonjean curves

light ship weight estimate

floodable length and freeboard

powering

arrangements (hull and machinery)

structure

Key:

concept design phase

contract design phase

preliminary design phase

detail design phase

… and a key concern in ship operation

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

Aalto University
School of Engineering

Course schedule

Lectures

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

Attendance is not obligatory, but highly recommended and c'mon is online
Lectures cover each topic. Some lectures rely on prior reading.
Deeper understanding through selected materials on MyCourses

Aalto University
School of Engineering

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

Aalto University
School of Engineering

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 17.9.2021
- Assignment will be introduced in details during Lecture 2
- Learning logs instructions will be provided via Mycourses today.
- **Learning philosophy:** problem-based learning and reflection

Aalto University
School of Engineering

Exam (important)

- **Date:** 25 October 2021

- **Time:** 13:00-16:00

- **Place: TBC**

- Exam covers all content from the lectures.
  Also the <u>obligatory</u> study materials (articles, texts) given online on MyCourses are covered in the exam.
  Materials listed as <u>optional</u> reading 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

**Aalto University
School of Engineering**

Fast Quiz

- At the end of each lecture, you will have a fast quiz covering the contents covered in the lecture.

- The online quiz will contain questions that lead to a grade for the fast quiz that will be calculated as the weight for the final exam. How:

Student		Exam					Weight					
ID	Name	E-Q1	E-Q2	E-Q3	E-Q4	E-Q5	E-Q1	E-Q2	E-Q3	E-Q4	E-Q5	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

Aalto University
School of Engineering

Course grading

- Scale 1 (pass) – 5 (excellent)
- Calculation basis:
  - 45% "exam"
  - 40% assignment
  - 15% learning logs and feedback

Course staff 2021

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
- Autonomous shipping safety
- Winter navigation

Aalto University
School of Engineering

Ahmad Bahoo Toroody
Course assistant

Contact

- Send assignment and learning logs
- Questions and instructions for the assignment
- Any other practicality about the course
- Contact
  - ahmad.bahootoroody@aalto.fi

Teaching

- Lecture L2
- Contact
  - Present at all lectures

Research interests

- Safety and reliability of Smart shipping
- Smart maintenance
- Machine learning and AI

Martin Bergström, PhD
Post-doctoral researcher

Teaching

- Lecture L4
- Contact
  - Present at L3
  - Contact only regarding L3
  - martin.bergstrom@aalto.fi

Research interests

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

Aalto University
School of Engineering

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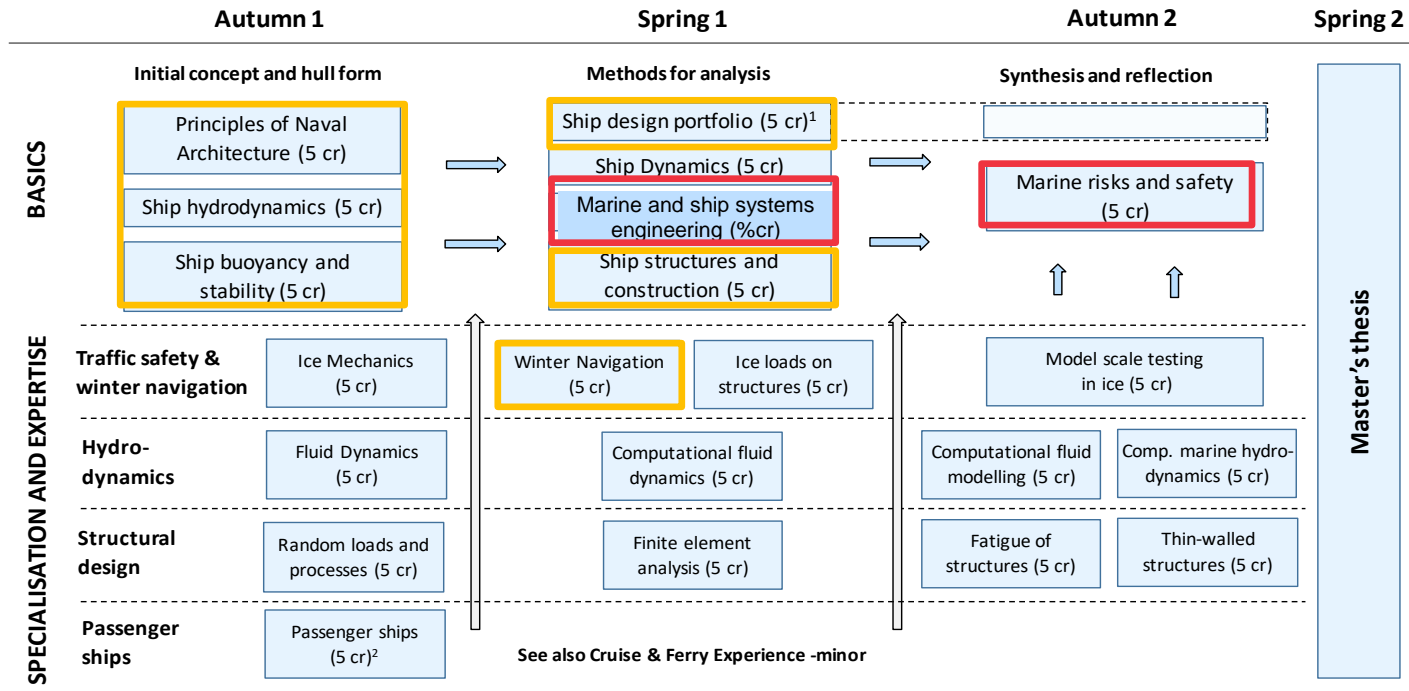
Teaching

- 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

More courses in MEC about safety:

MEC-E3004 Safety Management in Complex Sociotechnical Systems
MEC-E6003 Materials Safety