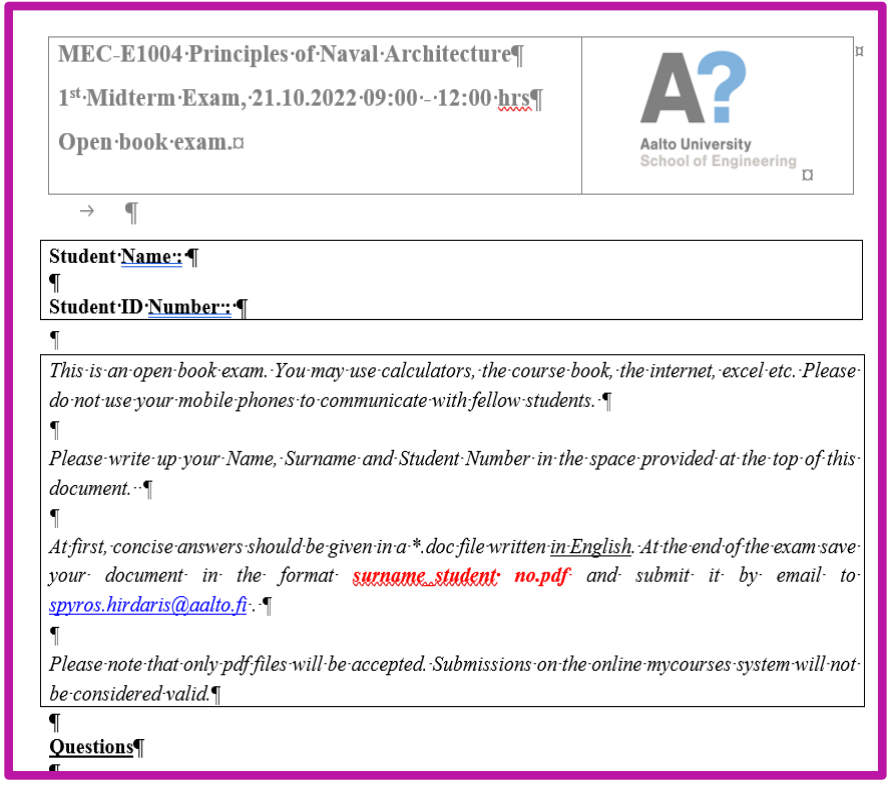
Aalto University
School of Engineering

MEC-E1004 Principles of Naval Architecture

1st Mid term exam revision

Exam rules of engagement

- ❑ Open book, you may use the web and any calculator you like
- ❑ You might have to use the xls sheets you have been using for your assignment
- ❑ You cannot text or call each other
- ❑ Multiple choice and essay questions to be answered over 3hrs
- ❑ 4 questions corresponding to lectures 1 – 5 + one bonus question
- ❑ You have to submit online and on time !!!



MEC-E1004 Principles of Naval Architecture

1st Midterm Exam, 21.10.2022 09:00 - 12:00 hrs

Open book exam.

Aalto University
School of Engineering

Student Name::

Student ID Number::

This is an open book exam. You may use calculators, the course book, the internet, excel etc. Please do not use your mobile phones to communicate with fellow students.

Please write up your Name, Surname and Student Number in the space provided at the top of this document.

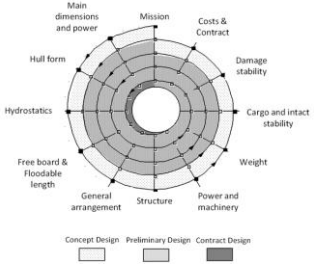
*At first, concise answers should be given in a *.doc file written in English. At the end of the exam save your document in the format* ***surname_student_no.pdf*** *and submit it by email to spyros.hirdaris@aalto.fi.*

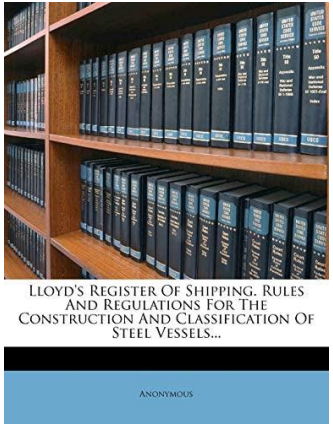
Please note that only pdf files will be accepted. Submissions on the online mycourses system will not be considered valid.

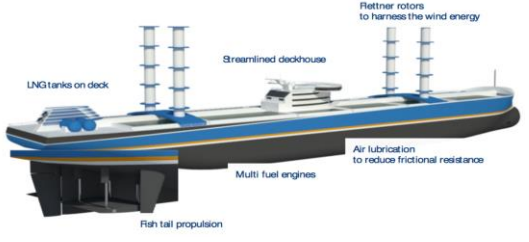
Questions

The Ship Design context

- Design parameters, variables and constraints
- The role of Rules and Regulations
- Shipping sustainability and green technologies
- Ship Design stages and the design spiral
- The importance of design innovation

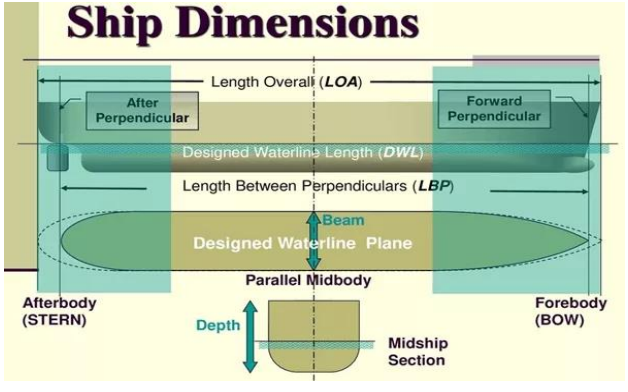






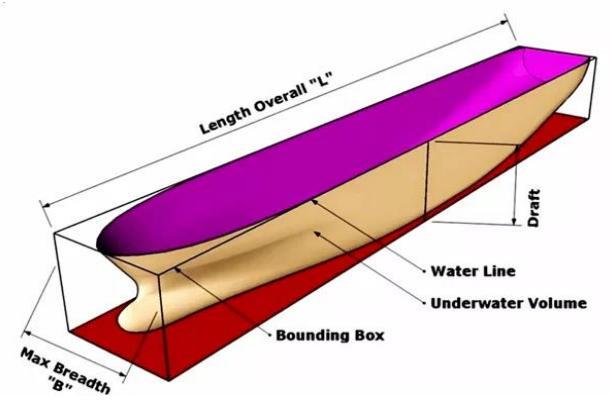
General definitions and ship terminology

- Different principles of categorizing a ship
- Categorize your group design project ship
- Explain the use of ***reference ship data***
- ***Terminology !!!*** (e.g., speed, weight, tonnage, displacement, flags of convenience, form coefficients, general particulars)
- Evaluation of ship general particulars



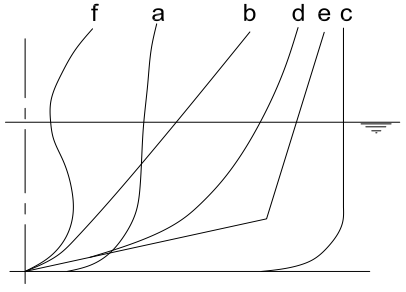
Main dimensins and design coefficients

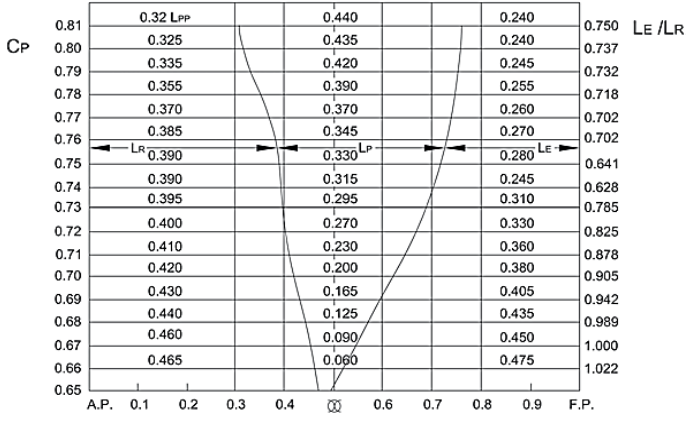
- What are the approaches to determine a ship's main dimensions
- What it means if a ship's capacity is (a) limited by weight, (b) limited by volume.
- Evaluation of ship design features using coefficients of form and main dimensions
- How can you use Ayre's formula to estimate the ship length and then calculate the block coefficient using Schneekluth formula ?

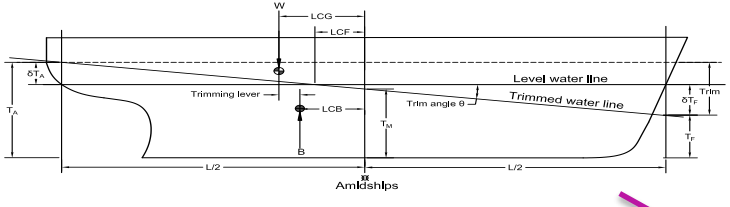


Hull forms and hydrostatics

- Basic hull form related terminology
- What factors need to be considered when determining the form of a ship's hull ?
- What are the key relationships between form factors ?
- How you can apply the above knowledge to shape your ship's hull ?

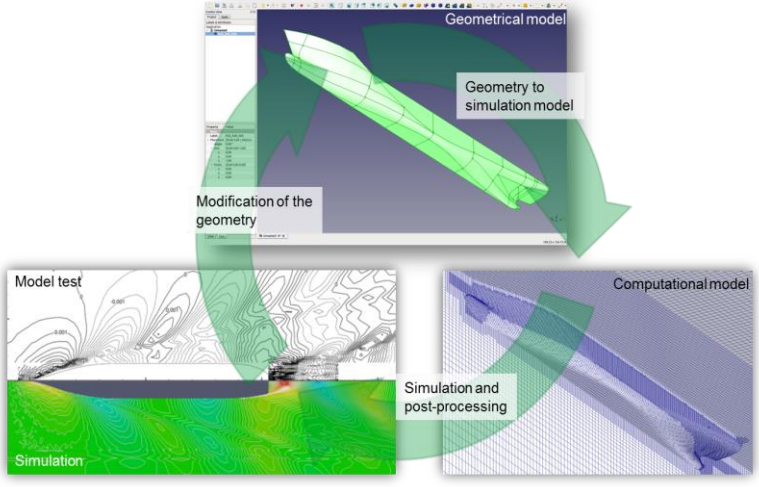




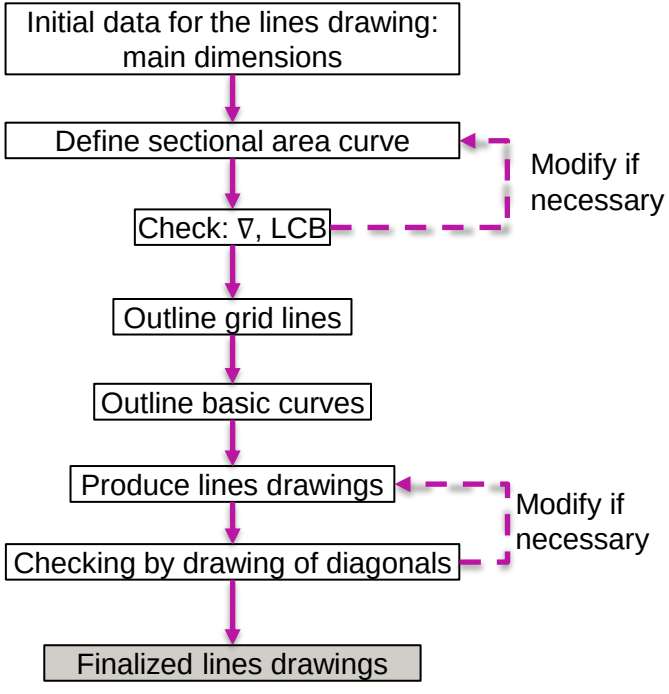


Basic definitions : *LCG, LCF, LCB, trim…etc.*

Hull forms and hydrostatics

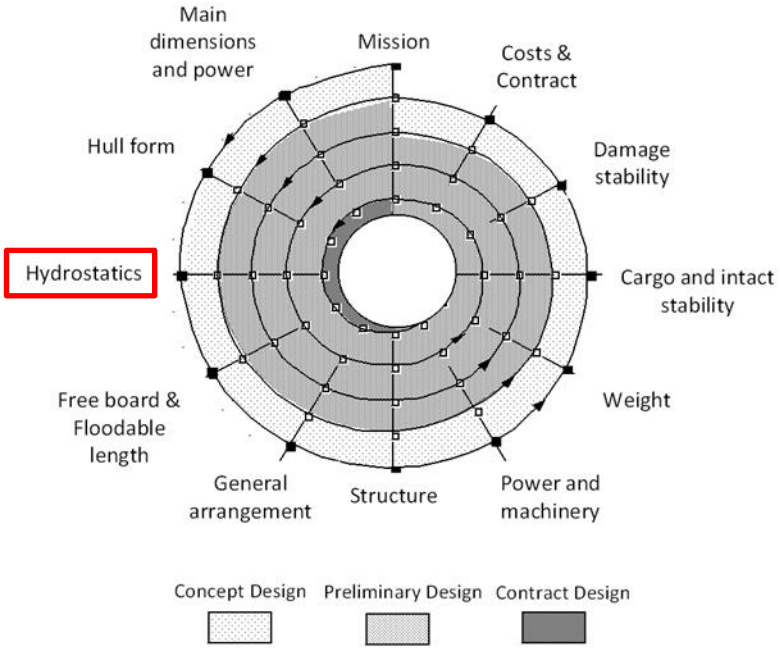


Traditional versus CAD systems



Hull forms and hydrostatics

- What is hydrostatics and why they are important in ship design?
- Numerical Integration methods !
- Explain and apply basic hydrostatic formulas and methods (Simpson's 1st Rule)



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Thank you !