

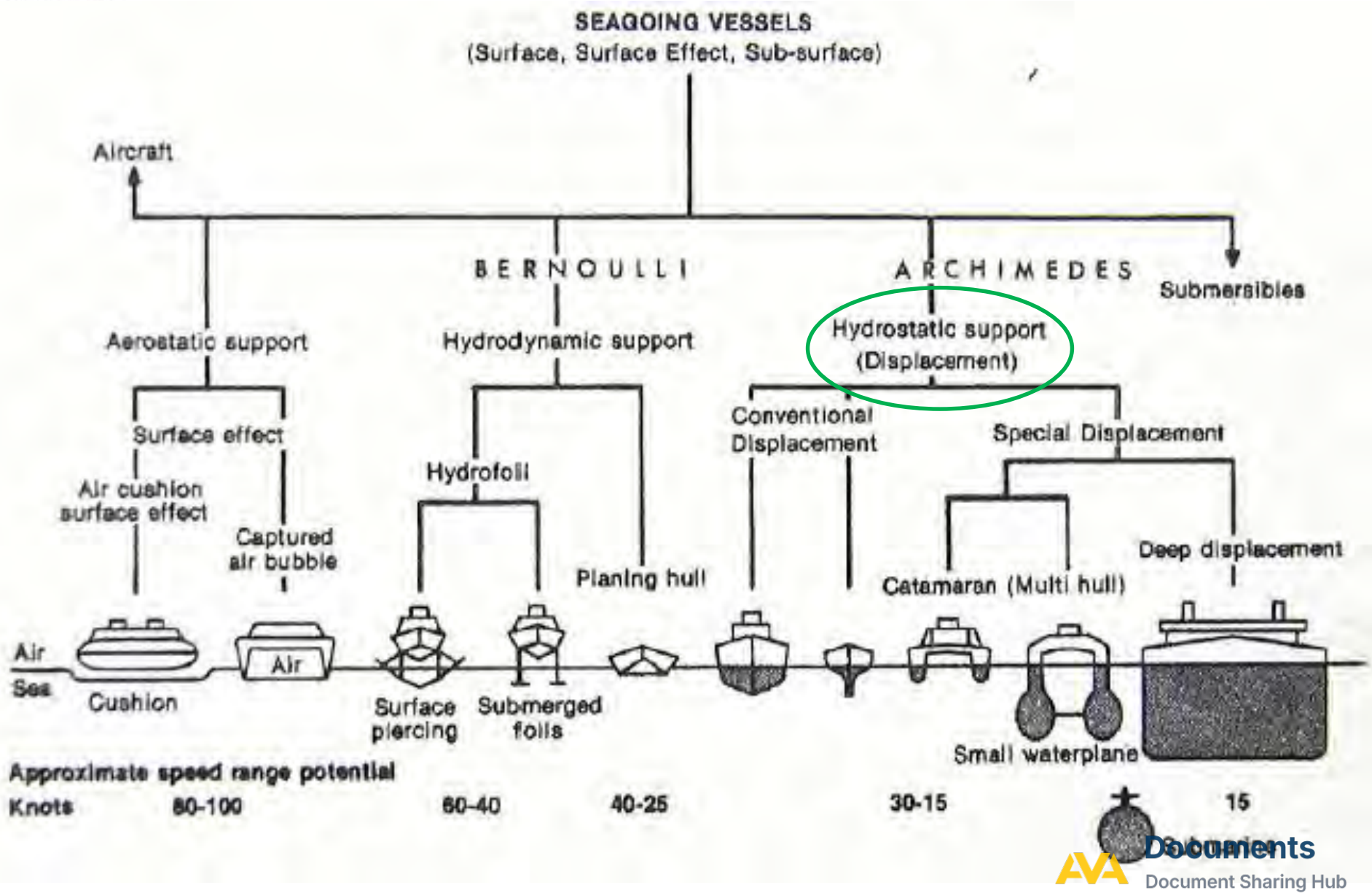
SHIP BUOYANCY AND STABILITY

Lecture 01 - Introduction

SHIP BUOYANCY AND STABILITY

Main info about the course:

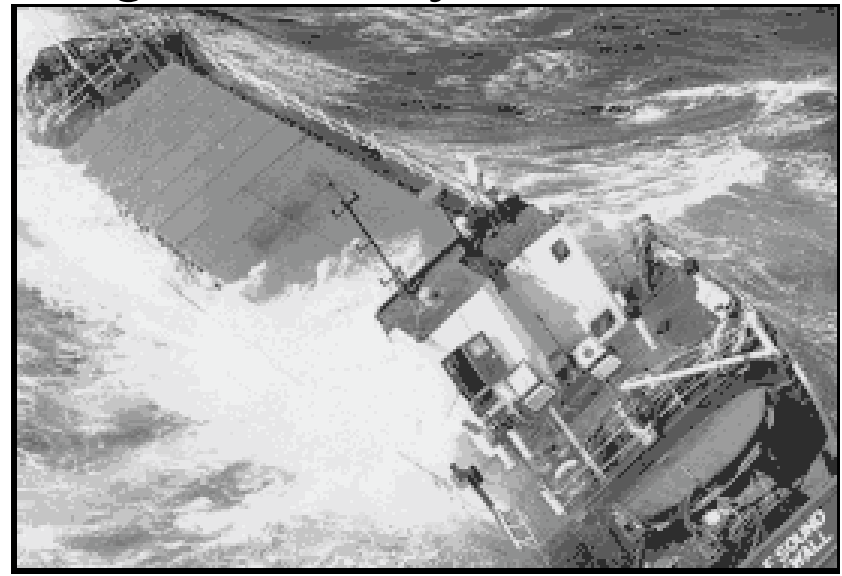
Credits	5 cr
Teaching Period	II (Autumn 2017)
Assessment Method and Criteria	Final examination. Compulsory exercises. Compulsory laboratory exercises.
Grading Scale	0-5. Exercise success can improve the final grade.
Language of Instruction	EN. English
Course Staff and Contact Information	PhD Maria Acanfora - lectures maria.acanfora@aalto.fi
Study material	Lectures and lectures slides in English. Exercise material both in Finnish and in English. Text book in Finnish



SHIP BUOYANCY AND STABILITY



Ship intact and damage stability



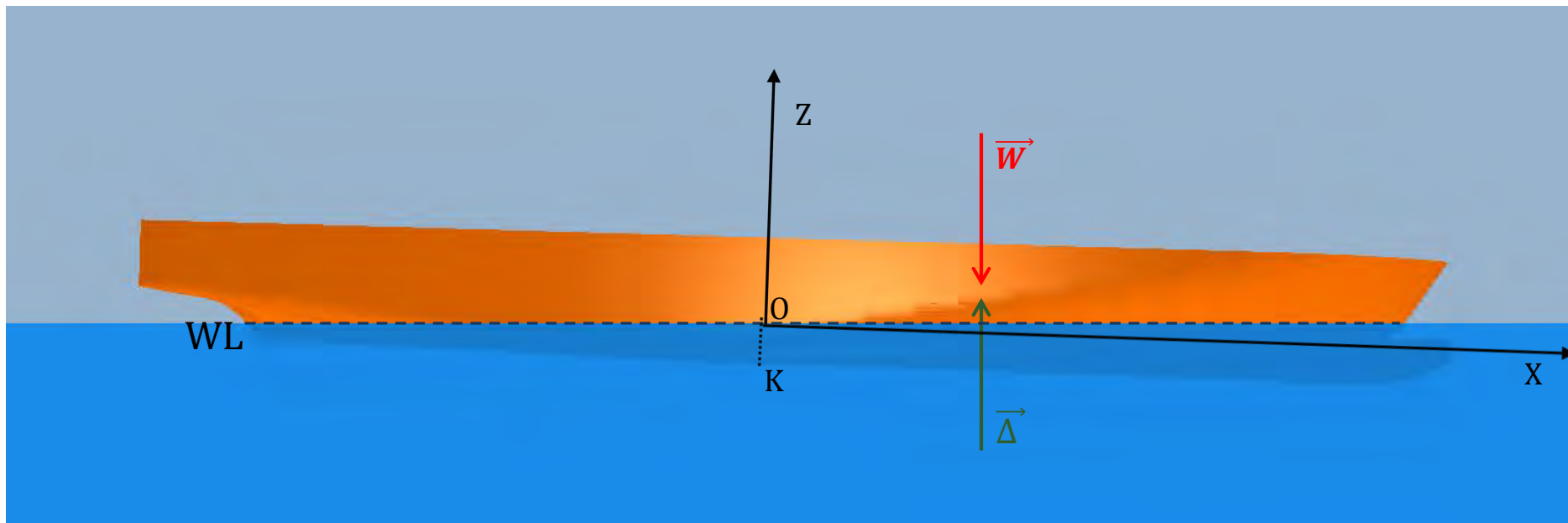
- Ship stability is strictly linked with safety;
- In her life a ship will be exposed to different external loading of stochastic nature;
- The Ship stability must be approached providing a reserve of buoyancy i.e. a safety margin in order to take into account all the uncertainties;

Main topics of the course

- Ship floating position at equilibrium for the different operative displacement condition;
- Stability of the equilibrium condition;
- Safety of the intact ship;
- Safety of the damaged ship.



How can I define the floating condition of the ship at the equilibrium?



$$\sum_{i=1}^N \vec{F}_i = 0$$

$$\sum_{i=1}^N \vec{r}_i \times \vec{F}_i = 0$$

Mechanical background

Equilibrium of the rigid body: a body is said to be in equilibrium when the external forces acting on it from a system of force equivalent is zero.

The necessary and sufficient conditions for the equilibrium of the rigid body are:

(i) the vector sum of all *external forces* is zero

$$\sum_{i=1}^N \vec{F}_i = 0$$

(ii) the sum of the moments of all *external forces* about any line is zero.

$$\sum_{i=1}^N \vec{r}_i \times \vec{F}_i = 0$$

