Ship Structure Syllabus (Academic Year 2013-2014)

Ship structure course provides a basic knowledge in FEM analysis focusing on structures of yachts and ships. The course starts with an introduction to the finite element theory, including hints of FEM history, definition of plane stress state and plane strain state, application of principle of virtual work to a single element.

The core of the course is represented by a first approach to the MSC Patran/Nastran platform, starting from an introduction to Pre/Post processor Patran: creating a new database, files managing, workspace setting. Lessons are organized in four main topics: geometric modeling, meshing, load and boundary conditions and results evaluation.

The first topic is of great importance because, even if it's possible to import a geometry from an external modeler, often it's necessary to rebuild or modify the imported geometry in order to make meshing easier. The students are taught to manage multiple system of reference, create geometric entities, vectors plane and to edit them.

Meshing is the second important topic; students are taught to create a mesh starting from a geometric entity, create elements from nodes, verify the congruency between elements and the quality of the elements created. It also explained the difference between various orders of elements, from 1D bar to brick elements.

The Load-Boundary Condition-Material Property topic concerns about creating material properties , apply the correct property to the structure (also in a space-dependent or temporal dependent form) and setting restraints in a correct way.

The last topic concerns to the solving of the problem, the extraction of results and the evaluation of their significance.

Each main topic is assessed in more than one lesson, depending on their difficulty and the students response. At the end of each single concept practical exempla are provided in order to facilitate understanding. Every main topic is closed by exercises preparatory to the final exam.