

# Meshing, Pre and Post Processing



Component  
École Nationale  
Supérieure  
d'Électrotechnique  
d'Électronique

## In brief

- > **Amety's Code:** N9EM03C
- > **Open to exchange students:** No

## Presentation

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### Objectives

The aim of this course on meshing is to make students self-sufficient in the creation of geometry (CAD), and in the creation of meshing (structured, unstructured, hexahedral, tetrahedral, polyhedral, hybrid, boundary layer, surface mesh, etc.): basic concepts, role and importance of meshing and its quality in numerical simulation (including HPC), presentation of different meshing algorithms (front advance, empty sphere, etc.). The aim is for students to clearly understand what they are doing when using a mesher, and to critically analyze their meshing in terms of the solver they want to use and the physics to be solved.

The main mesh types (triangular and tetrahedral, quadrangular and hexahedral, hybrid, surface and volume, polyhedral, etc.) are detailed. The algorithms used in free (Salome, Gmsh) or commercial (Ansys tools, Simail) mesh generators are presented.

A set of rules and best practices for mesh generation is outlined, along with the quality criteria associated with different types of mesh.

Particular emphasis is placed on tips for formatting and enhancing the value of simulation results, in order to make the most of the results obtained in this course as well as in the BEI or later in their careers.

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### Description

- Meshing course
- Introduction / Examples
- Numerical methods and meshes
- Triangular and tetrahedral meshing algorithms

Quadrangular and hexahedral meshing algorithms

Hybrid methods

Surface meshes

Polyhedral meshes

Good meshing practices / Quality criteria

General conclusion on meshes

Meshes available at ENSEEIHT

Geometry construction principles

VISU and POST-PROCESSING course

Introduction

Technical constraints (images and videos)

Creating a quality video

Quality visualization: pitfalls to avoid, formatting, content, making the most of results

- Commercial / free viewing software

Viewing and post-processing tools available at ENSEEIHT

- TUTORIAL

- 4 hours working together on a subject with Salome, the project manager, to validate the basic concepts.

- Mini-projects: In pairs, students carry out mini-projects in which they choose the subject to be meshed (ramjet, arrow, triumphal arch, atmospheric re-entry module, submarine, airship, shell, platypus, etc.), the mesher (Salome, Gmsh, Ansys tools, StarCCM+, simail, comsol, etc.) they want to use and the solver (Code\_Saturne, Ansys, StarCCM+, etc.). These mini-projects are assessed in an oral presentation. The meshes generated must have been run on the solver of their choice ...