

Academic path MOCA (Modelling and Fluid-Structure Computation) of the engineering school of the university of Toulon (SeaTech)

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The course « Modelling and Fluid-Structure Computation » (MOCA) develops cross skills in [mechanics](#), [applied mathematics](#), [computer science](#) and [numerical methods](#). Indeed, the new challenges in mechanical engineering are multidisciplinary and often require the implementation of high performance computing. This course aims to use and develop mathematical and mechanical skills to progress in simulations and engineering design of structures, fluid flows and their interactions.

Alternating theoretical and practical training, these courses lead to many job opportunities in the aerospace industry, automotive, oil industry, energy, environmental industry, ecology ...

Syllabus of MOCA: course outline

This description does not take into account projects the first year of the core curriculum, internships, elective courses and joint courses in languages, human sciences and business organization.

Second year (equivalent to master 1) Semester 3 (252h)

Mechanics 102h

- Solid mechanics **30h**
- Fluid mechanics **30h**
- Hydrodynamics **24h**
- Thermal science **18h**

Applied mathematic 78h

- Variational methods **18h**
- Finite element **30h**
- Finite volumes **30h**

Scientific computing 1 72h

- Computing & Fortran 90 **18h**
- Numerical methods **36h**
- Python **18h**

Second year (equivalent to master 1) Semester 4 126h

Numerical simulations 72h

- Abaqus 36h
- OpenFoam 36h

Scientific computing 2 54h

- Applied numerical methods 36h
- Introduction to C++ 18h

Third year (equivalent to master 2) Semestre 5

Thermomechanical models75h

- Nuclear engineering 21h
- Porous media 21h
- Fluid-Structure Interaction 21h
- Turbulence 12h

Numerical simulation 69h

- Fluent 36h
- Multiphasic flows 21h
- Discrete element method 12h

Applied mathematic 93h

- Discontinuous finite element method 21h
- Finite volume 30h
- Optimisation 21h
- Stochastic algorithms 21h

Scientific computing 99h

- Parallel computing 21h
- Applied numerical methods 36h
- Object Python 21h
- Artificial intelligence 21h