



2<sup>ND</sup> AND 3<sup>RD</sup> YEAR SPECIALISATION

# PROPULSION AND TRANSPORT

The blend of skills acquired will allow students to get to grips with propulsion systems in their entirety, using an energy-based approach (modelling, experimentation and simulation), and covering the technical, economic and environmental challenges. The originality of this specialisation lies in its multi-disciplinary nature (thermodynamics, gas dynamics, combustion, optimisation).



## COURSE CONTENT

- > Combustion and pollutant emissions in propulsion
  - > Internal combustion engines
  - > Thermodynamics for propulsion
  - > Turbomachines for propulsion
  - > Gas dynamics
  - > Energy management in automotive applications
  - > Automotive propulsion - Electric and hybrid
  - > Propulsion systems in aeronautics
  - > Project 1
- > Space launchers
  - > Marine propulsion
  - > Railway engineering
  - > Practical work in propulsion
  - > Project 2
  - > Internship



## EXAMPLES OF PREVIOUS PROJECTS

- > Hybridisation of a long-haul heavy goods vehicle (project management, combustion engine, electric engine - hybridisation, thermal management, supercharging - hybridisation, aerodynamics, cabin, air quality, regulations, cost)
- > Influence of the geometry of an intake line on the performance of an internal combustion engine
- > OD modelling of a thermo-fluid system and experimental validation
- > Improvement in the experimental setup of a turbojet bench
- > Energy optimisation on-board ship

## INDUSTRY SECTORS

- > Energy-related propulsion
- > Automotive
- > Aeronautics
- > Aerospace
- > Naval
- > Railway
- > Design office

## CAREER PROSPECTS

This specialisation gives access to numerous professions in the automotive, aeronautical, space, maritime and railway sectors:

- > Design engineer
- > Modelling and optimisation engineer
- > Test engineer
- > Technical marketing engineer, etc.

## TEACHING STAFF

### HEAD OF SPECIALISATION:

Georges Salameh

### CENTRALE NANTES LECTURERS:

Vincent Berthomé, David Chalet, Pascal Chessé, Jean-François Hétet, Thierry Jaszay, Alain Maiboom, Laurent Perret, Xavier Tauzia

### EXTERNAL SPEAKERS:

Academic: Centrale Paris, University of Nantes, etc.  
Industry: Renault, PSA, MANN+HUMMEL, Honeywell, IFPEN, MAN, Snecma, Turbomeca, Alstom, etc.

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## EXAMPLES OF PREVIOUS INTERNSHIPS

- > Arianespace: OD / 1D fluid modelling of a cryogenic upper stage (ESCA) for Ariane 5
- > Mann+Hummel: Improvement in thermal simulation of an internal combustion engine through nodal modelling of the cylinder block and head
- > Snecma: Kinematic study of the control system with variable valve high pressure compressor
- > Manitou: Study and modelling of an engine / transmission / hydraulic control solution for a telescopic forklift truck in order to optimize the vehicle's energy resources
- > AVL: Engineering on engine test bench
- > CMT: Analytical and experimental study of automotive turbocharged engines
- > Renault Formula 1: Study and development of water, oil and air regulations in order to simulate F1 engine behaviour during a lap
- > PSA: Combustion modelling for spark-ignition engines
- > STX/ Reduction of the pollutant emissions for a ship
- > Semitan: Determination of the natural gas consumption of buses

