



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

# SCIENTIFIC CHALLENGE 2024

HIGH FIDELITY MODELLING OF THE COMPLETE BOAT-OAR-ROWER SYSTEM

With the upcoming 2024 Olympic and Paralympic Games in Paris and the relationship forged between Centrale Nantes, CREPS des Pays de la Loire and the French Rowing Federation through various research projects, there is a willingness to expand the links between scientific research and the sports community.

Students are afforded the opportunity to take part in these scientific challenges - to develop tools capable of providing concrete answers in the field, and to acquire scientific skills and knowledge, through an ambitious engineering and research project.



## COURSE CONTENT

In the first year of the project, a prototype simulator of the boat-oar-rower(s) system was finalized. The challenge now lies in the industrialization phase, so that the simulator is operational from the start of the 2020-2024 Olympiad.

- > Make digital simulation an operational tool for rowing for the 2024 Olympic Games
- > Improve reliability and facilitate simulator implementation to ensure professional quality
- > Undertake the essential validation phase using existing field measurements, but also by developing measurement methods for missing data
- > Conduct parametric studies of the determinants of sports performance in rowing from simulations
- > Make the research results accessible for sports experts
- > Use the simulation results to propose training tools for coaches



2018/2019 project team



## PROJECT-BASED TEACHING

The objective is to train engineers capable of undertaking large-scale projects, providing relevant solutions to issues in the field, within efficiently organized project teams. This innovative project-based teaching method will allow students to acquire competences in a different way thanks to:

- > A customised training programme
- > Agile and autonomous organisation
- > Tailored support
- > Scientific challenges linked to industrial issues (naval hydrodynamics, MRE, simulations, etc.)
- > A database of experimental measures carried out within the French teams
- > An opportunity to take concrete action on an ambitious performance support project in preparation for the 2024 Paris Olympics

## PROJECT DELIVERABLES

- > A programme to process field measurements performed by the French team, which will also serve to train the whole team on the key project tools
- > A module to generate all the data input (biometric measurements of rowers, body movements, equipment parameters, etc), with a measurement protocol (scan, dedicated bench, etc.) for each part
- > A realistic display model as a vehicle for communication to enhance performance and discussion with the sports community
- > An experimental validation database
- > Analysis and optimization of the SPRing simulator's performance
- > Regular project monitoring deliverables (minutes, reports and progress indicators, planning, set up of a bug/improvement tracking tool)

## EXAMPLES OF PREVIOUS INTERNSHIPS

Project-based learning is highly valued by companies. Student internships are quite varied, and reflect the diversity of backgrounds.

- > Development of hydrodynamic meta-models and CFD validation, Artemis Technologies, UK
- > Graphic reconstruction of an electronic horizon, Renault Software Labs, Sophia-Antipolis
- > Executive Assistant: Project Management and Financial Reporting, Haemers Technologies, Brussels
- > Thermo-hydrodynamic modelling on a heat exchanger, Naval group, Nantes
- > Numerical simulation of ship maneuvers, Numeca Int., Brussels,
- > CAD and subsystem design of the 'Heron Tree', Les Machines de l'île, Nantes

## FIELDS OF ACTIVITY

- > Research and development
- > Instrumentation
- > Modelling
- > Scientific computing
- > Sports performance analysis
- > Company organisation
- > Communication

## SKILLS

- > Project engineering
- > Numerical simulation
- > Software development
- > Experimental Methods
- > Managing complexity
- > Teamwork
- > Knowledge transfer

## TEACHING STAFF

### HEAD OF SPECIALISATION:

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### SPORTS RESEARCH CONTACT:

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