ESTACA
ECOLE D'INGENIEURS

EXPANDING HORIZONS OF MOBILITY

POST-MASTER DEGREE
MOTORSPORT ENGINEERING PERFORMANCE

STUDY IN ENGLISH, LIVE IN FRANCE

MS MASTÈRE SPÉCIALISÉ

GROUPE isae

A UNIQUE PROGRAM IN FRANCE TO MEET THE NEEDS OF THE COMPETITIVE MOTORSPORTS SECTOR

Competitive motorsports need qualified engineers specially trained to work in this sector. The Motorsport Engineering Performance Post-master's degree answers this need with a course that builds high-level skills and expertise in the Motorsport sector. Developed jointly with French companies, this MS® provides training in design, optimization and organization of all the technical solutions in the Motorsport sector, but also mastery of special production and manufacturing methods.

PROGRAM IN BRIEF

Aim
Acquire the skills to :
- Design, optimize and organize all the technical solutions;
- Master and implement product manufacturing methods;
- Take account of the productivity and quality imperatives of the Motorsport sector.

Program benefits
- Teaching faculty heavily involved in the industrial sector;
- Concrete and practical project-based approach.

Skills acquired
- Identify the different categories, race tracks and regulations in motorsport;
- Understand the sensor technology, analyze signals for reliability, analyze and create performance tools to present quantifiable results for car development / performance;
- Identify race vehicle architecture, make and analyze dimensioning calculations, pilot and analyze mechanical tests, propose new solutions, optimise a structure, get to know "new" materials;
- Define aerodynamic principles, identify aerodynamic phenomena, conduct and analyze wind tunnel tests, use CFD for analysis, organize track trials;
- Identify the architecture of a combustion engine, an electric, hybrid and hydrogen engine;
- Analyze gearbox technology;
- Identify the materials used in tyres, analyze tyre behavior, analyze the impact of tyres on performance;
- Analyze pilot behavior, identify track safety, perform driving analysis on track and on simulator;
- Manage projects, write reports, communicate and speak in public.

700 hours of academic coursework including a industrial project followed by a professional thesis (October to February).

6 months minimum of in-company operational training (March to August).

Assessment
- Teaching modules assessed via exams and case studies;
- Academic project & Professional thesis assessed via dissertation.

Job prospects
- **R&D Engineer**: design engineer, structural engineer, calculation engineer;
- **Aerodynamics**: aerodynamicist engineer, CFD engineer, wind tunnel engineer, aerodynamic track engineer;
- **Powertrain**: powertrain design engineer, powertrain control engineer, engine support engineer;
- **Electronics**: system engineer; electronic engineer;
- **Track operations**: data engineer, performance engineer, track support engineer, strategy engineer, simulation engineer, DiL engineer;
- **Management**: technical director, project leader, technical project manager, coordinator.

Course breakdown: Lectures, case studies, team work project and management.

Language: English

Number of credits: 75 ECTS

PROGRAM

INTRODUCTION TO MOTORSPORT
Data processing with Matlab
Basic network architecture and electronics
Introduction to thermal engine and gearbox
Driver coaching and driving (FFSA)
Analysis of data on a simulator (WINTAX)
Operating a Formula 4 on track (FFSA)
Track safety
English for Motorsport
100 Student Hours - 7 ECTS

DESIGN OF A RACING VEHICLE: THE FUNDAMENTALS
Regulation analysis and impact on the race car design
Basic of car racing aerodynamics
Basics in tyre knowledge
Basic vehicle dynamics knowledge and performance parameters
Basic embedded systems
70 Student Hours - 6 ECTS

RACING VEHICLE AERODYNAMICS
Basic aerodynamics
Completion, analysis and CFD optimization
Monitoring, completion and wind tunnel test analysis
Wind tunnel labwork
70 Student Hours - 6 ECTS

POWERTRAIN DEVELOPMENT
Thermal engine structure
Transmission and gearbox
Electric motor architecture and energy storage
Hydrogen engine
Hybrid process and monitoring systems
Impact fuel on the ICE design
60 Student Hours – 5 ECTS

Note: the above program might be subject to minor changes.

OPERATIONS ON RACING CIRCUITS
Recommendations and a typical vehicle fine-tuning Pilot's behavior analysis
Organizing a team on the track
Race event preparation
Sensor and data acquisition in race vehicules
Development of realibility and performance analysis tools (Motec)
Race strategy on Trackside software
Driver behaviour analysis on ESTACA simulator
Race preparation on a circuit, in collaboration with students of the Meka association
90 Student Houts - 6 ECTS

INDUSTRIAL PROJECT
200 Student Hours - 15 ECTS

PROFESSIONAL THESIS
110 Student Hours - 10 CTS

IN COMPANY OPERATIONAL TRAINING
24 Weeks - 20 ECTS

A PROGRAM DESIGNED JOINTLY WITH INDUSTRIAL PARTNERS

This training course is proposed in partnership with the FFSA Academy (French Federation of MotorSport) that prepares young drivers and mechanics from all around the world in order to reach the motorsport's world top level.

It covers the construction of the program, joint teaching of course modules, the availability of business experts and the team premises for "projects". ESTACA aims to meet the human, technical and operational needs of companies working in the competitive motorsports sector.

Among the companies and federations involved in the program are the FIA, Renault Sport Racing, Automobile Club de l'Ouest and Peugeot Motorsport.

WORK AT THE HIGHEST LEVEL OF MOTORSPORTS

Following an initial job as a tyre engineer with Pirelli in England for Formula 1 and GT, in 2017 I joined the Red Bull Racing team that employ the French driver Pierre Gasly and Max Verstappen. I am a simulator performance engineer. It consists of preparing the drivers prior to each grand prix in a driving simulator, to prepare for the race and especially so they can learn the minutest details of the track. The simulator is also a very powerful tool for the team that can be used to test settings on the car before the race weekend and check that they satisfy the drivers. It's a fascinating job that enables me to work at the highest level of motorsports but also to be in constant contact with drivers, while ensuring their performance and that of the car. ESTACA prepared me early on for all these aspects of racing, mainly through quality course but also thanks to the various internships in companies.

Maxime MENNEGLIER,
ESTACA 2016 graduate,
Performance Engineer, Envision Racing

STUDY CLOSE TO MOTORSPORTS RACING CIRCUITS

TWO SITES FOR ONE PROGRAM: ESTACA-LAVAL AND FFSA LE MANS

Classes in the Motorsport Engineering Performance Post-Master's Degree are held on two sites. Part of the course is given at 'ESTACA-Laval, in the Mayenne department (1½ hours from Paris by TGV). Classes include visits to the race teams on the region. The second half of the program is given at Le Mans race track, on the premises of FFSA Academy.

ESTACA GRADUATE ENGINEERING SCHOOL

Founded in 1925, ESTACA is a member of ISAE group, 1st world cluster in aerospace training and research. ESTACA is highly specialized in the fields of aeronautics, space, automotive, railway and naval industries.

The training courses constantly evolve to meet the requirements of companies and adapt to the emergence of new technologies or disciplines. ESTACA's graduates undertake the design, development and production of transport systems and components. The industry has ranked ESTACA among the best engineering schools for its expertise in the transportation fields.

ESTACA IN FIGURES

3
campuses: ESTACA-Paris Saclay, ESTACA-Laval and ESTACA-Bordeaux

450
graduates per year

2,500
students

10,000
alumni

2
research teams

ISAE IN FIGURES

Group of the 5 most prestigious French engineering programs in Aerospace: SUP'AERO, ENSMA, SUPMECA, ESTACA, École de l'Air et de l'Espace, ENAC

6,000
students at a high scientific level in aerospace

475
doctoral students

68,000
alumni

700
faculty, researchers and engineers

PRACTICAL INFORMATION

Eligibility
This program is open to all foreign and French students holding a Master Degree (preferably in scientific fields, business master may also apply). Applicants proving 3 years of professional experience should have completed four years of studies in an engineering (Master Level ot Advanced Bachelor). Applicants should have English language proficiency (TOEFL iBT: 91, TOEIC: 850 or IELTS: 6.5).

Location
ESTACA-Laval, Le Mans

Tuition fees
16,000€ (reduced fees for young students graduating in the last year and ESTACA Alumni: 14,000€)

Admission process
Admission upon application, possibly with an interview.
- Application Form available on the website: www.admissions.estaca.fr
- Application period: application is to be sent before May 30th for non-european students (visas requirements) and July 30th for European students.

Degree accredited by the Conférence des Grandes Ecoles*
www.cge.asso.fr

* The « Conférence des Grandes Ecoles » is a French national institution that represents the best Graduate Engineering Institutions accredited by the Commission des Titres d'Ingénieur (CTI) to deliver the French Graduate Engineer Diploma equal to a Master's degree.

ESTACA
ECOLE D'INGENIEURS

ESTACA - Laval
Parc Universitaire Laval-Changé
Rue Georges Charpak - BP 76121
53061 Laval Cedex 9
Tel: +33 (0)2 43 59 47 00

www.estaca.fr

Informations
post-master@estaca.fr
Katia Garceran, Head of Post-Master Degrees
Tel : +33 (0)1 76 52 11 09
Nora Smain, Post-Master Degrees assistant
Tel : +33 (0)1 76 52 11 58

GROUPE ISAE