



**UNIMORE**

UNIVERSITÀ DEGLI STUDI DI  
MODENA E REGGIO EMILIA

# Department of Engineering “Enzo Ferrari”

**Master’s Degree Programme  
in Advanced Automotive Engineering**



# Master's Degree Programme in Advanced Automotive Engineering

Department of Engineering  
"Enzo Ferrari"  
Modena Campus

2 years, full time  
ECTS credits: 120

Programme start: September 2020

## Teaching Programme

### 1° year

*First common semester - Modena*

Manufacturing and Assembly Technologies/  
Science and Technology of Metallic and  
Composite Materials (12), Mechanical of  
vibrations (6), Vehicle Conceptual Design (6)

*Second semester*

*Advanced Powertrain - Modena*

Internal combustion engines (6), Engine  
Components Design and Manufacturing/Au-  
tomotive Computer Aided Design CAD (12),  
Electric Drives (12), Automatic Controls (6),  
Mechanical transmissions (6)

*Advanced Powertrain - Bologna*

Electric Drives/Electric Propulsion Systems (12)  
Powertrain Design and Manufacturing (6),  
Electronics systems/Automatic controls (12),  
Internal Combustion Engines (6)

*High Performance Car Design*

CFD fundamentals and aerodynamics (9),  
FEM fundamentals and chassis design (9),  
Vehicle dynamics (12), Automotive Compu-  
ter Aided Design CAD (12), Automatic Con-  
trols (6)

*Racing Car Design*

CFD fundamentals and aerodynamics (9),  
FEM fundamentals and chassis design (9),  
Vehicle dynamics (12), Automotive Compu-  
ter Aided Design CAD (6)

*Advanced Motorcycle Engineering*

Powertrain Design and Manufacturing (6),  
Electronics systems/ Automatic controls (12),  
Electric Drives/Electric Propulsion System  
(12), Internal Combustion Engines (6)

*Advanced Sportscar Manufacturing*

Powertrain Design and Manufacturing (6),  
Electronics systems/ Automatic controls (12),  
Electric Drives/ Electric Propulsion System  
(12), Internal Combustion Engines (6)

### 2° year

*Advanced Powertrain Modena*

Design and modelling of high performance  
combustion systems (12), Mechanical tran-

missions/Automatic controls (12), Electro-  
mechanical Energy Storage and Conversion  
(6), Examination chosen by the student (12),  
Final project (12), Internships and/or Labora-  
tory (12)

*Advanced Powertrain - Bologna*

Modeling and Control of Internal Combus-  
tion Engines and Hybrid Propulsion Sys-  
tems / Advanced Combustion Systems  
(12), Electrochemical Energy Storage and  
Conversion (6) Powertrain Testing, Calibra-  
tion and Homologation (6), Examination  
chosen by the student (12), Final project (12),  
Internships and/or Laboratory (12)

*High Performance Car Design*

Vehicle NVH testing (6), Automotive Electro-  
nic systems (6), Automatic controls (6), Au-  
tomotive fluid power systems (6), Examination  
chosen by the student (12), Final project (12),  
Internships and/or Laboratory (12)

*Racing Car Design*

Dynamic testing of vehicles (6)  
Experimental aerodynamics (6), Chassis and  
body design (6), Dynamic testing of vehicles  
(6), Lightweight materials and composites  
(6), Examination chosen by the student (12),  
Final project (12), Internships and/or Labora-  
tory (12)

*Advanced Motorcycle Engineering*

Modeling and Control of Internal, Combus-  
tion Engines and Hybrid Propulsion Sys-  
tems (6), Motorcycle Vehicle Dynamics (6),  
Chassis and Body Design and Manufactu-  
ring/Vehicle virtual design (12), Powertrain  
Testing, Calibration and Homologation (6),  
Examination chosen by the student (12), Fi-  
nal project (12), Internships and/or Labora-  
tory (12)

*Advanced Sportscar Manufacturing*

Industrial Plants Design (6), Industrial Robo-  
tics (6), Algorithms and systems for big data  
processing (6), Operations & Supply chain  
design and management/Automotive Manu-  
facturing and assembly systems (12), Exa-  
mination chosen by the student (12), Final  
project (12), Internships and/or Laboratory (12)

## Presentation

The Master's Degree Programme in Ad-  
vanced Automotive Engineering is an  
international and inter-university pro-  
gramme launched by MUNER - Motorve-  
hicle University of Emilia Romagna, the  
association created thanks to a synergic  
connection among University of Modena  
and Reggio Emilia, University of Bolo-  
gna, University of Parma and University  
of Ferrara, with the essential support of  
the Emilia-Romagna's most important  
private companies of the Automotive  
industry such as Automobili Lamborgh-  
ini, Dallara, Ducati, Haas F1, HPE Coxa,  
Ferrari, Marelli, Maserati, Scuderia Toro  
Rosso. The Programme aims at develop-  
ing knowledge and application skills con-  
cerning the design and manufacturing of  
high-performance cars and motorcycles.

## Course content

The main features of the Programme are:

- academic staff selected by an inter-university Steering Committee made up of professors and Italian and international experts of the private sector
- accurate selection procedure of the 120 students through the evaluation of their background and interviews based on technical and motivational aspects
- common first semester for all students, held in Modena ("Enzo Ferrari" Department of Engineering) and dedicated to basic skills development
- six different curricula (max 20 students each): Advanced Powertrain – Modena, Advanced Powertrain – Bologna, High Performance Car Design – Modena, Racing Car Design - Parma, Advanced Motorcycle Engineering – Bologna, Advanced Sportscar Manufacturing – Bologna
- lectures are taught in English and include theoretical classes as well as practical classes in the laboratories of the University and of the private companies in order to develop high-level profession-

# Advanced Automotive Engineering

al competencies with a “learning by doing” approach

- mandatory internships and thesis preparation activities based on a “project working” approach and offered by the most relevant private companies of the Automotive industry and by the research laboratories of the universities.

## Career options

Advanced Automotive Engineering graduates are professionals able to design, to develop and to manufacture the main subsystems of cars and motorcycles thanks to a comprehensive understanding of the vehicle system. A particular focus is on the premium segment of the market, on competition vehicles and on the correspondent technological and manufacturing processes. Specific competences to be developed include an advanced knowledge of the following systems and components: thermal, hybrid and electric propulsion, including energy storage and conversion and related modeling and control issues; “cold” architecture of commercial and competition cars and motorcycles; manufacturing systems characterized by typical aspects of the Industry 4.0 trend (industrial robotics, supply chain design and management, big data etc.). The multidisciplinary approach is a key element of this professional profile. However, given the growing complexity of the new generation vehicles and the correspondent need of vehicle engineers performing many specific tasks, the universities and the private sectors partners have defined 5 specific professional profiles to become experts in: High Performance Car Design, Racing Car Design, Advanced Powertrain, Advanced Motorcycle Engineering and Advanced Sportscar Manufacturing.

## How to apply

- Register on the [www.esse3.unimore.it](http://www.esse3.unimore.it) site under the Registration heading and insert the data requested,
- after having obtained the access cre-

dentials, do the login and then click on Application for evaluation from the left-hand menu,

- subsequently, to complete the procedure connect to the link as specified in esse3 and in the guide to the application for admission,
- complete the application for evaluation, inserting the information requested.

## Fees and scholarships

Min. €600 – max. €2,200. You can apply for the following benefits: 1. A scholarship with total exemption from tuition fees; 2. A reduction of tuition (for those not eligible for total exemption); 3. A financial aid for accommodation and meals. The rules and requirements for submitting the application are contained in the “Notice of Benefits for Entitlement to Study” (Bando Benefici per il Diritto allo Studio) published by ER.GO: [www.er-go.it](http://www.er-go.it). Incoming students willing to apply for benefits are recommended to contact ER.GO at an early stage of their application to the Master, to be informed on the deadlines. You may also want to contact the International Welcome Desk for guidance on any practical issue, including applications for VISA.

## Department of Engineering “Enzo Ferrari”

The Department of Engineering “Enzo Ferrari” in Modena manages teaching and research activities in Civil and Environmental Engineering, Computer Engineering, Electronics Engineering, Mechanical and Vehicle Engineering.

In this Department new opportunities arise from the synergic mixing of teaching, research, both theoretical and applied, and technology transfer. Devoted Interdepartmental Centres and Incubators are located in the same Campus. Through its Internship Office, the Department promotes and manages the provision of traineeships, using a well-established network of relationships with business associations, individual companies, professional firms, government

agencies, foundations, and national and international institutions. In this context, of particular importance to the implementation of framework agreements with trade associations, and agreements with individual companies, aimed at the constant pursuit of learning goals and to maintaining an effective relationship between University and companies.

## About UNIMORE

UNIMORE has a longstanding tradition (it was founded in 1175) and is considered one of the best universities in Italy for teaching and research. It is ranked 1st among the engineering programs in 2015, according to Italy’s leading financial daily. With over than 27,000 students including 3,500 postgraduates, it is large enough to offer all the facilities one would expect from a major university (well-stocked libraries, computer rooms, free internet connection and study support services) but small enough to retain a personal and friendly learning environment. Located in the heart of one of Europe’s wealthiest and most dynamic regions, which is world-renowned for its production of mechanical parts, engines, sports cars (e.g., Ferrari and Maserati) as well as for its agro-food sector, ceramic tiles and manufacturing industries. UNIMORE benefits from a longstanding relationship with the area’s firms and corporations, which provide private support for university research and a unique opportunity for on-the-job training before graduation.

## Contacts

### Programme web page

[www.international.unimore.it](http://www.international.unimore.it)  
[www.aae.unimore.it](http://www.aae.unimore.it)

### Programme coordinator

Prof. Francesco Leali  
[francesco.leali@unimore.it](mailto:francesco.leali@unimore.it)

### International Welcome Desk

[internationalwelcomedesk@unimore.it](mailto:internationalwelcomedesk@unimore.it)

### Information Desk

[informastudenti@unimore.it](mailto:informastudenti@unimore.it)



# UNIMORE

UNIVERSITÀ DEGLI STUDI DI  
MODENA E REGGIO EMILIA

[ingmo.unimore.it](http://ingmo.unimore.it)