

ART. 1 - TYPE OF MASTER'S PROGRAMME

The University of Pavia has activated a first-level Master's course in "**Race Engineering**" in the Department of Industrial and Information Engineering for the 2020/2021 academic year..

The course takes advantage of the educational, logistic and organizational collaboration of ASC S.r.l. (Quattroruote Automotive Safety Centre) and of SkyDrive.

Edizione: III

Disciplinary area: Industrial engineering

ART. 2 - EDUCATIONAL AIMS, PROFESSIONAL OPPORTUNITIES AND COURSE APPEAL

The aim of the Master's programme is to produce highly qualified professionals with a solid preparation in managing competition race cars. Specific competence will be gained by the students in the techniques for car set up in a virtual manner through CAE as well as through the possibility of experimenting on the track, during the entire duration of the programme, with a Formula 4 and auto GT car driven by a professional pilot. The learning environment is highly innovative and includes classroom lessons along with test sessions on the track of the Quattroruote magazine's Centro di Guida Sicura, during which students will have hands-on learning of the techniques and methodologies of *Race Engineering* activities (from race car management to radio communications to the psychological aspects in relations between the pilot and the team). All participants will follow an introductory course in advanced driving techniques specifically designed for the programme, a fundamental feature of which is the interaction with professional *Race Engineers* for the entire length of the programme.

The training programme for the Master's ends with specific training on a VI-Grade compact static simulator installed in a room in the Vistarino building and with a specific training module on the SkyDrive dynamic simulator at the Monza Speedway.

Career opportunities for graduates involve all the racing units and race teams in motor sports competitions in Europe and the world. More specifically, the competencies acquired from the Master's programme represent a key factor in permitting students to quickly and successfully become part of a racing team. At present this type of engineering professional, strongly requested by the market, is not associated with any specific academic programme.

The Level I Master's in "Race Engineering" is offered to international students who are young engineers with a passion for *motor racing*.

Affiliated with the programme are firms such as McLaren, Pirelli, CD Adapco/Siemens, Seat, Thyssen Presta, AudiSport, ZF-TRW, McLaren, Pirelli, CD Adapco/Siemens, Seat, Thyssen Presta, AudiSport, ZF-TRW, Ycom, Brembo, Lamborghini, Prema Power team, Team Lazarus, JAS Motorsport, Tatuus, Autotecnica Motori, Maserati, Alfa Romeo, Magneti Marelli, FCA, Abarth, Ferrari, Michigan Scientific, Michelin, Oreste Berta, Danisi Engineering.

ART. 3 - MASTER'S DEGREE PROGRAMME

The Master's course lasts one year (1,500 total hours - **60 CFU**) and can be broken down into: lectures held at the University of Pavia (Faculty of Engineering and at Palazzo Vistarino), and the ASC - Centro di Guida Sicura (Vairano di Vidigulfo, PV), practical training at ASC – Safe Driving Centre (Vairano di Vidigulfo, PV), technical visits to structures related to the course, final internship with partner companies, seminars, study activities, preparation and individual training.

Lessons for the Master's course are expected to begin in October 2020.

La sede istituzionale del Master è presso la Facoltà di Ingegneria dove vengono svolte le lezioni frontali e le esercitazioni al computer. Presso palazzo Vistarino, sede della Fondazione Alma Mater Ticinensis, che ospita anche il master in Design and Development of Vehicle Dynamics, vengono svolte alcune lezioni frontali, i seminari e gli incontri con le aziende e le attività addestrative mediante l'utilizzo di un simulatore di guida compatto.

Technical seminars will be given by researchers from our university or from other universities, including the Federico II University of Naples, the University of Pisa and the Polytechnic of Milan, along with experts from various companies including FCA, Abarth, VI-Grade, Pirelli, Seat, CSI, MegaRide, Brembo, Danisi Engineering, Alfa Maserati. There will also be technical visits to the test centre of Balocco (FCA), the Driving Simulator Centre of Danisi Engineering, the CSI headquarters and laboratories, and the Pirelli circuit at Vizzola Ticino.

Student attendance at the various training activities is mandatory for at least 75% of the total number of hours. The training period cannot be suspended.

Transfers to similar Master's courses at other universities are not permitted.

The Master's course, which mainly addresses an international market, may be conducted in English depending on the number and nationality of enrolled students.

The teaching modules are organized as follows

Module	SSD (disciplinary are)	ContentS	No. of classroom hours	No. of hours of practicals/lab courses	Hours of indiv. study	Total hours	Course credits
I) Integrated teaching: Designing the Vehicle Dynamics							
1) Vehicle Dynamics Fundamental	ING-IND/13, ING-IND/14, ING-IND/15 ING-IND/06	Fundamentals of vehicle dynamics. Aerodynamics. Tires.	60	0	90	150	6
2) Virtual Dynamics, Design and Simulation	ING-IND/13	Multibody analyses introduction. Adams Car. Real-time analyses. From real-time virtual Dynamics to Dynamic driving simulator.	8	32	60	100	4
3) VI-Grade Static Simulator training	ING-IND/13	Experimental training with static driving simulator.	8	32	60	100	4
II) Integrated teaching: Propulsion and Control							
4) Propulsion: ICE, Hybrid, Electric	ING-IND/08, ING-IND/32	Internal combustion engines. Principal characteristics and features. Architecture. Consumption. Electric Motors. Generators. Accumulation Systems. Power supply. Recharging. Connection Systems. Wiring. Protocols. Diagnostics.	30	0	45	75	3

5) Vehicle Dynamics Control	ING-INF/04	Introduction to the main regulators. Braking control systems, stability, traction, and vector control.– Classical problems, Vehicle dynamic control, Measurements, sensors and observers	10	0	15	25	1
III) Integrated teaching: Vehicle experimentation and pilot/vehicle interaction							
6) Advanced Driving Course	ING-IND/13, ING-IND/34, ING-INF/05, ING-INF/06, BIO/09	Driving experience and training	2	8	15	25	1
7) Skydrive Dynamic Simulator	ING-IND/13	Simulation of race track activities propaedeutic to the final examination	10	0	15	25	1
8) Race Track Management and Vehicle Set Up for Performance	ING-IND/13, ING-IND/14, ING-IND/04	Basic knowledge and tools evaluation. Manuals and regulations. Methodology for an effective race car setting. Analyses of Track tests.	18	72	135	225	9
9) Race Engineering Science	ING-IND/13, ING-INF/05, ING-INF/06, BIO/09	Every day task and performance evaluation. Development of a methodology to 'read driver's mind'. Teambuilding.	10	0	15	25	1
10) Data acquisition	ING-IND/12, ING-IND/13	Data acquisition systems. Data analysis. Transducers and sensors. Experimental training.	8	32	60	100	4
11) Biomechanics: Driver/Vehicle interaction	ING-IND/13, ING-IND/34, ING-INF/05, ING-INF/06, BIO/09	Methodology and tools for the evaluation of driver/vehicle interaction. Comfort and features. Integrated system of measurement and monitoring. Driver physiology. Psychophysical stress and physiological adaptation. Environmental factors.	20	0	30	50	2
Partial total of hours/CFU			184	176	540	900	36
Internship-training-seminars						550	22
Final exam						50	2
Total hours/CFU						1500	60

ART. 4 – IN-COURSE ASSESSMENTS

Learning is assessed during the course by the teachers giving the lessons and practicals, leading the seminars and the practical tests, and supervising the students' work. There is no specific mark for course examinations and the final exam.

ART. 5 – FINAL EXAMINATION AND CONFIRMATION OF QUALIFICATION

The final exam will entail the presentation and defence of a written thesis regarding the traineeship activity undertaken by the candidate.

At the end of the Master's course, participants who have completed all of the activities and fulfilled their obligations and passed the final exam, will be awarded a Level I Master's degree in: "Race Engineering".

ART. 6 - – FACULTY

Teaching will be carried out by faculty from the University of Pavia and from other universities as well as by highly-qualified outside experts.

ART. 7 – ADMISSION REQUIREMENTS

The Master's programme is aimed at students who possess:

1. **a degree in accordance with D.M. (Ministerial Decree) 270/2004 pertaining to the class of degrees in:**
 - Industrial engineering - L-9
with particular reference to degree programmes in mechanical, aerospace, electrical, energy, mechatronics, industrial, materials, and automotive engineering
2. **a degree in accordance with D.M. 509/99 pertaining to the class of degrees in:**
 - Industrial Engineering - 10
with particular reference to degree programmes in mechanical, aerospace, electrical, energy, mechatronics, industrial, materials, and automotive engineering.
3. **a second-cycle degree in accordance with D.M. 270/2004 pertaining to one of the following classes:**

▪ Mechanical Engineering - LM-33	▪ Energy and nuclear engineering - LM-30
▪ Aerospace and astronautics engineering - LM-20	▪ Science and the Engineering of Materials - LM-53
▪ Electrical Engineering - LM-28	▪ Automation Engineering - LM-25
4. **a specialist degree in accordance with D.M. 509/99 pertaining to one of the following classes:**

▪ Mechanical engineering - 36 / S	▪ Energy and nuclear engineering - 33 /S
▪ Aerospace and astronautics engineering - 25 /S	▪ Science and the Engineering of Materials - 61 /S
▪ Electrical Engineering - 31 /S	▪ Automation Engineering - 29 /S
5. **a degree in accordance with the previous regulations in:**

▪ Mechanical engineering	▪ Electrical engineering
▪ Industrial engineering	▪ Nuclear engineer
▪ Aerospace engineering	▪ Materials engineering

In the event of admissions applications from foreign students, the Faculty Board will evaluate the equivalence of the foreign degree and the Italian degree required for admission to the Master's programme.

The maximum number of enrolments is **14**.

The minimum number necessary for activation of the course is **7** enrolments.

The Faculty Board may also assess whether the conditions exist for extending the aforementioned number of places.

If the number of applicants exceeds the maximum number called for, a Committee made up of the Coordinator and two members of the Master's faculty will determine a ranking based on merit (expressed in hundredths) which takes into account the following evaluation criteria:

1. Up to a maximum of 30 points for the graduation mark as follows:
 - 10 points for a graduation mark <than 100/110
 - 11-21 points for graduation marks from 100/110 to 110/110 (for a mark of 100 points, 11 points are awarded, and the score is increased by one point for every additional mark achieved)
 - 30 points for marks of 110/110 'cum laude'
2. Up to a maximum of 70 points for an interview in Italian or English, whose aim is to evaluate the competencies, capacities and motivations of the candidate regarding the content and specific objectives of the Master's programme. Special recognition will be given for any work experience in the automotive sector – such as scientific publications related to the topic area of the Master's – and for knowledge of specific development software such as Matlab, Simulink, Adams, etc. Students pass the interview with a score of at least 42/70.

In case of a tie in the rankings, the younger candidate will be given preference.

Should one or more candidates who are admitted to the course renounce their place, such places shall be made available to those candidates whose names appear in the final classification, until all places are assigned.

ART. 8 - DEADLINE FOR ADMISSION APPLICATION

Candidates must send off their application for admission, according to the procedures established by the Call for Applications, **from 7 August 2020 until the deadline of 25 September 2020.**

ART. 9 - ATTACHMENTS TO THE APPLICATION

Candidates must attach the following documentation during the online registration procedure for the Master's course:

- application for admission to the Master's programme (the form to be used is on page 7)
- photocopy (double-sided) of the personal identification document included during registration;
- in the case of a qualification obtained abroad:
 - ✓ copy of the qualification required for admission, along with exams taken and corresponding marks, translated into Italian
 - ✓ copy of the "declaration of value" issued by the Italian Embassy/Consulate in the country where the academic qualification was obtained (only if already available)
- **Transcript of records** (or self-certification of exams passed during university studies in Italy) with details of the marks obtained;
- **references;**
- **motivational letter;**
- **curriculum vitae** highlighting any professional experience in work areas pertaining to the Master's course;

Please note that as indicated in Article 3 of the General Call for admissions, candidates holding a qualification obtained abroad must, **before the deadline of 11/01/2021**, deliver **the original** of the following documentation, legalized by the Italian Embassy or Consulate in the country where the aforementioned qualification was obtained, to the Health and Post-Graduate Service - Exams of State (via Ferrata No. 5 Pavia):

- academic qualification required for admission indicating the exams taken and corresponding marks, translated into Italian
- "declaration of value"

The above requisites must already be in the candidate's possession by the deadline for the submission of the application for admission.

ART. 10 - UNIVERSITY TUITION AND FEES

Enrolment:

Those enrolled in the Master's course must pay the sum of € 15,000.00 inclusive of: € 16.00 (stamp duty) and € 142.00 (administrative fees) for the 2020/2021 academic year.

This amount must be paid in two instalments:

- First instalment of € 10,000.00 to be paid upon enrolment;
- Second instalment of € 5,000.00 to be paid by 11/01/2021.

Final exam:

To be admitted to the final exam, candidates must submit the application form along with the payment of € 116 as a fee for the issuance of the Master's diploma (including n°2 stamp duty paid virtually: one for the parchment and one for the application).

ART. 11 – WEB SITE AND ORGANIZATIONAL SECRETARIAT:

Any communication to candidates will be announced by means of publication on the following **website**:

<http://raceengineering.unipv.eu/>

For information on the organization of the course contact the:

Organizational Secretariat

Department of Industrial Engineering and Information

Prof. Carlo E. Rottenbacher, Ms. Laura Pecoraro

Tel. 0382/6992200

Fax 0382/6992228

E-mail: info.raceeng@unipv.it

**APPLICATION FORM
TO I LEVEL MASTER IN "RACE ENGINEERING"**

(the form, duly filled in, must be uploaded in the on-line procedure of admission to the master course as per issue n°9 of the annex to the relevant call for admissions)

The undersigned (FORENAME, SURNAME) _____

Date of birth _____ City _____ State _____

State of residence _____ Permanent address _____

_____ E-mail _____

APPLIES

For admission to the aforementioned master course

And **ATTACHES**

to the formal admission form the following papers **to be submitted mandatorily for the application evaluation:**

1. photocopy of the personal ID document/passport uploaded during the on-line registration procedure;
2. transcript of records/self declaration of the passed exams during the Italian academic career reading relevant marks.
3. In addition, whoever achieved a foreign academic title must attach:
 - ✓ copy of the Degree diploma
 - ✓ copy of the "declaration of value" issued by the Italian Embassy/Consulate in the State where the academic title had been released (only if already available)
4. reference letter;
5. motivational letter;
6. CV listing professional experiences in working environments pertaining the above master.

Date, _____

Signature _____