

PHD PROGRAMME TABLE 37TH CYCLE

Section “Available Positions and scholarships” and “Admission exams” modified on 13/05/2021

Section “Available Positions and scholarships” and “Admission exams” modified on 20/05/2021

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| PROGRAMME’S NAME | AUTOMOTIVE ENGINEERING FOR INTELLIGENT MOBILITY |
| DURATION | 3 years |
| PROGRAMME START DATE | 01/11/2021 |
| LANGUAGE | English |
| MANDATORY STAY ABROAD | 3 months |
| COORDINATOR | Prof. Nicolò Cavina (nicolo.cavina@unibo.it) |
| CURRICULA | <ol style="list-style-type: none"> 1. Vehicle Design, Manufacturing and Systems Integration 2. Energy Systems, Powertrains, Vehicle Performance 3. Vehicle Informatics and Connectivity |
| RESEARCH TOPICS | Detailed list at the bottom of the present document |
| PHD POSITIONS | 22 |
| ADMISSION PROCEDURE | Qualifications and research proposal evaluation Oral examination |

Available Positions and Scholarships

| Pos. n. | Financial Support | Description | Curriculum | Positions linked to research subjects |
|---------|-------------------|--|------------|---|
| 1 | PhD Scholarship | Totally funded by the University of Bologna general budget | 3 | Semiconductor power devices for automotive applications |
| 2 | PhD Scholarship | Totally funded by the University of Bologna general budget | 1 | Innovative bolted connections for automotive applications |
| 3 | PhD Scholarship | Totally funded by the University of Bologna general budget | 2 | Advanced joint SI-CI Combustion Systems Concept Development for Clean and High Efficiency Internal Combustion Engines |
| 4 | PhD Scholarship | Totally funded by the University of Bologna general budget | 3 | Big data for sustainable and resilient road network operations |
| 5 | PhD Scholarship | Co-funded by the University of Bologna general budget and the Department of Industrial Engineering | 1 | Artificial intelligence approaches for the design and management of automotive manufacturing systems |
| 6 | PhD Scholarship | Co-funded by the University of Bologna general budget and the Department of Industrial Engineering | 2 | Design of multiphase converters, electric machines and drives for fault tolerant traction applications |
| 7 | PhD Scholarship | Funded by CEMI Mobility Technology Holding Limited | 2 | Battery Management System of swappable battery packs |
| 8 | PhD Scholarship | Funded by Università di Modena e Reggio-Emilia | 1 | Advanced methods, techniques and technologies for design, production and management of high-performance vehicles |
| 9 | PhD Scholarship | Funded by Università di Modena e Reggio-Emilia | 2 | High efficiency and rare material free electrical machines for circular economy in automotive |
| 10 | PhD Scholarship | Funded by Università di Modena e Reggio-Emilia | 3 | Advanced ICT to monitor driver drowsiness |
| 11 | PhD Scholarship | Funded by Università di Parma | 3 | Embedded Systems for autonomous driving |
| 12 | PhD Scholarship | Funded by Università di Parma | 2 | Energy management in electric/hybrid vehicles |
| 13 | PhD Scholarship | Funded by Università di Parma | 3 | Devices and systems for human-car-environment interaction |

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| 14 | Research Grant | Provided by the Department of Industrial Engineering. The research grant will have a duration of 36 months and gross percipient amount of € 73.277,97 | 2 | Predictive control of pollutant and CO2 emissions of hybrid vehicles |
| 15 | Dottorato industriale | Position reserved for employees of HPE S.r.l. | 2 | |
| 16 | PhD position without scholarship | | 1 | |
| 17 | PhD position without scholarship | | 2 | |
| 18 | PhD position without scholarship | | 3 | |
| 19 | PhD Scholarship | Funded by Alma Human AI | 3 | Formal methods for the integration of ethics, road regulations and control policies in intelligent self-driving vehicles |
| 20 | PhD Scholarship | Funded by Motori Minarelli S.p.a. | 2 | Innovative techniques for reducing the environmental impact of motorcycle engines |
| 21 | PhD Scholarship | Funded by Ferrari S.p.a. | 1 | Development of laser welding technologies for e-mobility components of interest to Ferrari |
| 22 | PhD Scholarship | Funded by Ferrari S.p.a. | 1 | Study and optimization of the hard magnetic materials (HMM) rectification process in the manufacture of rotors for electric motors |

Admission Exams

| | DATE AND TIME | RESULTS |
|--|--|------------------------------------|
| Qualifications and research proposal evaluation | Applicants' participation is not required | Available from 24/06/2021** |
| Oral examination | Date: starting from 06/07/2021 – 9:30 am CEST* Time: Remotely, using Microsoft Teams | Available from 09/07/2021** |

* In case that the oral examination cannot be completed in one day due to the large number of applicants, the oral examination detailed schedule shall be made available on the webpage [Studenti Online](#) together with the results of the qualifications evaluation. **During the oral examination applicants may express their interest in one or more positions linked to specific research topics.**

** The **results of the admission exams** will be available on the webpage [Studenti Online](#) (select “summary of the requests in progress” > “see detail” and open the .pdf file at the bottom of the page. **No personal written communication will be sent to applicants concerning the examinations results.**

Required and Supporting Documents to be attached to the application

(only documents in Italian, English, French, German and Spanish shall be considered as valid and be assessed by the Admission Board)

Only qualifications obtained during the last 5 calendar years shall be taken into consideration, except for the University Degree. The Admission Board will assess the relevance of the supporting documents to the PhD Programme.

| REQUIRED DOCUMENTS | |
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| Identity document | Valid identity document with photo (i.e. identity card, passport) |
| Curriculum Vitae | No specific CV format is required |
| Degrees | Documents attesting the awarding of the first and second cycle degrees, the exams taken and the marks obtained (see Art. 3 of the Call for Applications) |
| SUPPORTING DOCUMENTS | |
| Research proposal | Multi-annual research proposal, with special emphasis on the activities to be completed during the first-year course. The proposal must meet the following requirements: <ul style="list-style-type: none"> - it must mention on the first page the Curriculum of the PhD Programme associated to the research proposal; - it cannot exceed 20.000 characters, including spaces and formulas, if present. This figure does not include: the title, the outline, references and images (such as graphs, diagrams, tables etc - where present); - it must include: state of the art; project's description; expected results; references. |
| Thesis abstract | Abstract of the second cycle degree thesis . Graduands may submit the draft of their thesis (abstracts cannot exceed 5.000 characters, including spaces and formulas, if present. The above figure does not include: title, outline, images such as graphs, diagrams, tables etc. if present) |
| Publications | List of publications (i.e. monographs, articles on scientific journals, volume chapters), minor publications (conference papers, etc.) and abstracts and posters presented during academic conferences |
| Other documents | <ul style="list-style-type: none"> - University Master Courses (Master Universitari di I e II livello) relevant to the PhD Programme - Research activity - whether basic, applied, translational, etc. - carried out in any capacity, including when covered by research grants, and as a staff member of research units - Language proficiency certificates - Periods of study abroad, outside the country of origin (e.g. Erasmus programme or other similar mobility programmes) - Other qualifications attesting the suitability of the applicants (scholarships, prizes, etc) |

Evaluation criteria *

Scores will be expressed in points out of 100, as follows.

1. Qualifications and research proposal evaluation

Minimum score for admission to the oral examination: 30 points, Maximum score: 50 points

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| Qualifications evaluation | Graduation final mark. Graduands shall be evaluated according to the Weighted Average Mark (WAM) | 20 points max |
| | Publications and other documents attesting the applicant's training and skills | 5 points max |
| Research proposal evaluation | Scientific value and innovative nature of the proposal | 15 points max |
| | Description and structure of the proposal | 5 points max |
| | Proposal feasibility | 5 points max |

2. Oral examination

Minimum score for eligibility: 30 points, Maximum score 50 points

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| English proficiency | 5 points max |
| Research project presentation | 30 points max |
| General knowledge of issues encompassed by the PhD Programme | 15 points max |

Oral examination aims to assess the suitability of the applicant for scientific research as well as the general knowledge of issues encompassed by the PhD Programme ([see the list of research topics at the bottom of the present document](#)). **The oral examination is carried out in English.**

*Possible further evaluation criteria will be available on the [University website](#), selecting the relevant PhD Programme > “More information”, at the bottom of the page in the section “Notices”.

Final Ranking List and Enrollment

Each PhD position is reserved for one of the Curricula covered by the PhD Programme. These positions will be awarded based on the Curriculum for which the applicant has expressed his/her preference in the statements made while filling in the application and mentioned on the first page of the research proposal submitted. In the event that the applicant has not mentioned the preferred Curriculum as described above, the Admission Board will assign him/her the most appropriate Curriculum based on the research proposal submitted.

Considering the expressions of interest for **topic-specific positions** above, the Admission Board will establish if the applicants can be considered eligible for the allocation of the positions linked to specific research subjects, taking into account their skills, experience and aptitude.

After the publication of the results of the oral examination, the **final ranking list** will be available on the [University website](#), selecting the relevant PhD Programme > “More information”, section “Notices” at the bottom of the page.

Following the publication of the final ranking list, successful applicants shall **enroll** on [Studenti Online](#) by the deadline indicated on the [University website](#), selecting the relevant PhD Programme > “More information”.

If a successful applicant withdraws from a position, the following applicant in the ranking list, who is also eligible for the specific position, will be contacted. During the replacement procedure, the new terms of enrollment shall be communicated via e-mail to the chosen applicant.

Research Topics

Curriculum 1: Vehicle Design, Manufacturing and Systems Integration

The curriculum pursues the education of researchers and high-qualified engineers, operating in the areas of design and manufacturing of the automotive sector, and able to address issues related to design and research activities in disciplines such as:

- Industry 4.0 and Advanced Manufacturing Technologies
- Supply Chain Management
- Industrial Automation and Robotics
- Big Data and Cloud Computing for Manufacturing
- Materials, Lighting Technology and Design Methods for improving Efficiency and Safety of Vehicles
- Vehicle Lifecycle Assessment. Circular Economy: Vehicle refurbish, re-use of Vehicle Parts.

Curriculum 2: Energy Systems, Powertrains, Vehicle Performance

The curriculum pursues the education of researchers and high-qualified engineers, operating in the areas of vehicle dynamics and energy management, and able to address issues related to design and research activities in disciplines such as:

- Electrification and Power Electronics
- Electric, Hybrid and ICE-based Powertrains
- Advanced Combustion and Aftertreatment Systems
- Batteries and Energy Storage Systems
- Vehicle Energy Management and Energy Optimization
- Vehicle Dynamics and Control

Curriculum 3: Vehicle Informatics and Connectivity

The curriculum pursues the education of researchers and high-qualified engineers, operating in the areas of vehicle digitalization and connectivity, and able to address issues related to design and research activities in disciplines such as:

- Vehicle Human Machine Interface and Infotainment systems
- Gamification for Improving Driver Behavior
- Vehicular networks, Vehicular Sensors and Big Data for Mobility
- Automatic and Autonomous Drive
- Connectivity for V2I - Vehicle to Infrastructure, V2V - Vehicle to Vehicle and V2G - Vehicle to smart Grid interfacing
- Data Analytics and Advanced Prediction Models