



Entdecke die FH Aachen-Kollektion

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International Automotive Engineering

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All information about the degree programme can also be found on the internet. To this end, use a suitable reader to take a photo of the QR code.

fhac.de/master-automotive-engineering





On graduation from this degree programme, you can expect to have acquired an excellent education as well as preparation for a future job in the automobile industry and for starting a doctorate programme. The high level of academic education in a 3-semester degree programme, or a 4-semester dual degree programme, will support students in becoming professionals in their fields of expertise.

The programme provides in-depth knowledge of industrial design approaches and research topics with regard to real-world vehicle requirements, market developments and legislative constraints.

This degree programme will prepare you excellently for being an expert in the Automobile Engineering segment. The following pages will give you an overview about possible fields you will be working in.

- Vehicle Integration and Design
- CAE Technical Calculation
- Testing and Validation
- Electrics/Electronic Development
- Project Management

The degree programme not only comprises the subjects of a dedicated focus area. You will, additionally, acquire versatile competences. The course of study takes place within the framework of international cooperation and is therefore taught in English. The training is supplemented by interdisciplinary modules, such as Techical German, Critical Thinking or Intercultural Communication.

Vehicle Integration and Design From Individual Modules to a Whole, Functioning Vehicle

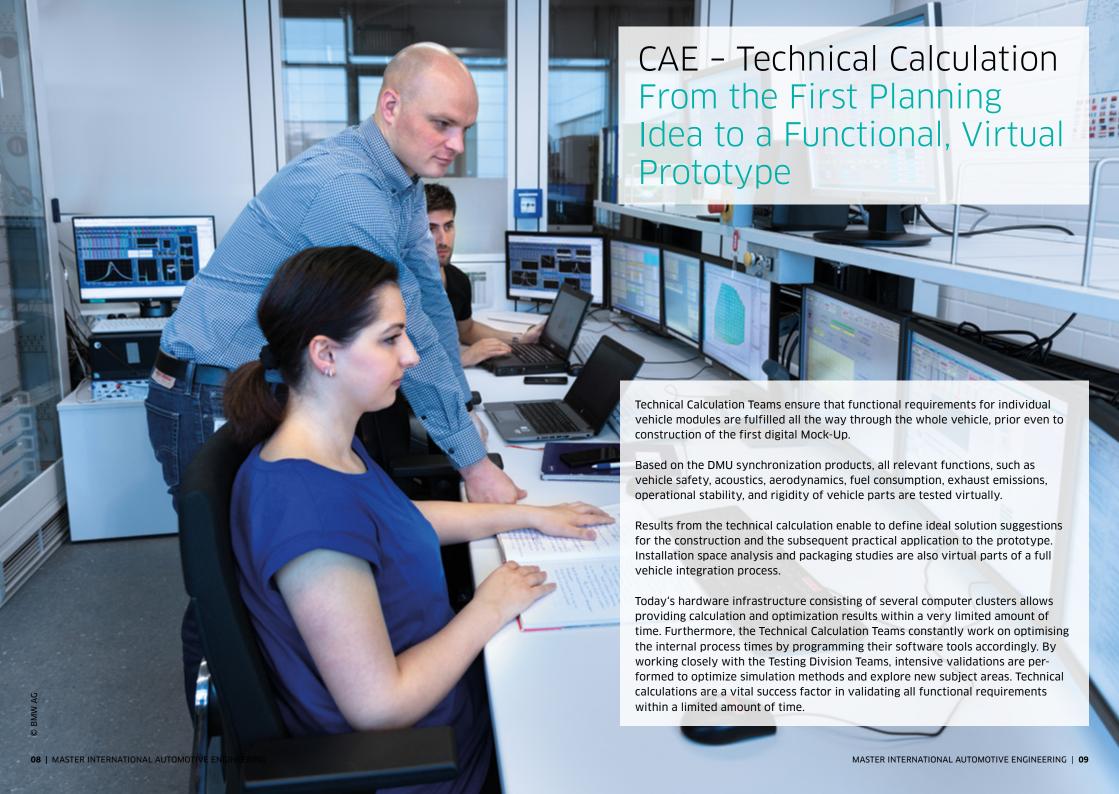
Vehicle Integration Teams keep an eye on the entire development process. Organising projects in an economical manner is just as important as fulfilling all customer and technical requirements...

The Vehicle Integration Team controls and monitors the defined requirements for vehicle safety, fuel consumption, emissions, acoustics and aerodynamics throughout the entire development process: from design, simulation, testing and validation to certification across all modules. It ensures the mechanical integration, the wedding of the powertrain/chassis system and the body while integrating electronic/electric systems and taking care of the homologation activities.

In order to plan for the validation of developments, it is important to establish project plans controlling the entire course of the project and covering all modules and functions. How many prototypes are needed? Which tests can be performed using which prototypes?



Together with the experts from all disciplines, the Vehicle Integration Team taps into synergy effects in order to reduce the prototype cost. The goal is to apply a development plan that is both time and cost effective. In order to comply with legal requirements, the Vehicle Integration Team ensures access to all applicable laws worldwide concerning vehicle development and supports the individual departments in their development efforts.









Project Management The Nerve Center

PROJECT MANAGEMENT

EXECUTIN

CONTROLLING **MONITORING**

PLANNING

The challenge is bringing together customers, system developers and partners to work as an integrated team. To this end, minimising and supporting the interface is one of the key factors.

Development projects need to be well-structured and effectively organised so that their complexity remains at a controllable level, and deadlines, budgets and pre-defined quality goals can be met.

For successful project management, this is the guiding principle. Planning, continued testing, recognising optimisation potential and regulation make up the control system Project Management Teams have mastered. At the same time, standardised management methods have to be utilised that enable to adjust to individual client processes.

Project Management Teams ensure a project is handled optimally by establishing a clear analysis of customer requirements, defining product oriented responsibilities and by matching expectations with industryspecific application of each individual task.





Admission Requirements

3-Semester Degree Programme

Only applicants with the following qualifications can be considered for the application procedure: An excellent Bachelor Degree in Automotive Engineering or Mechanical Engineering with corresponding specialisations with at least 210 ECTS

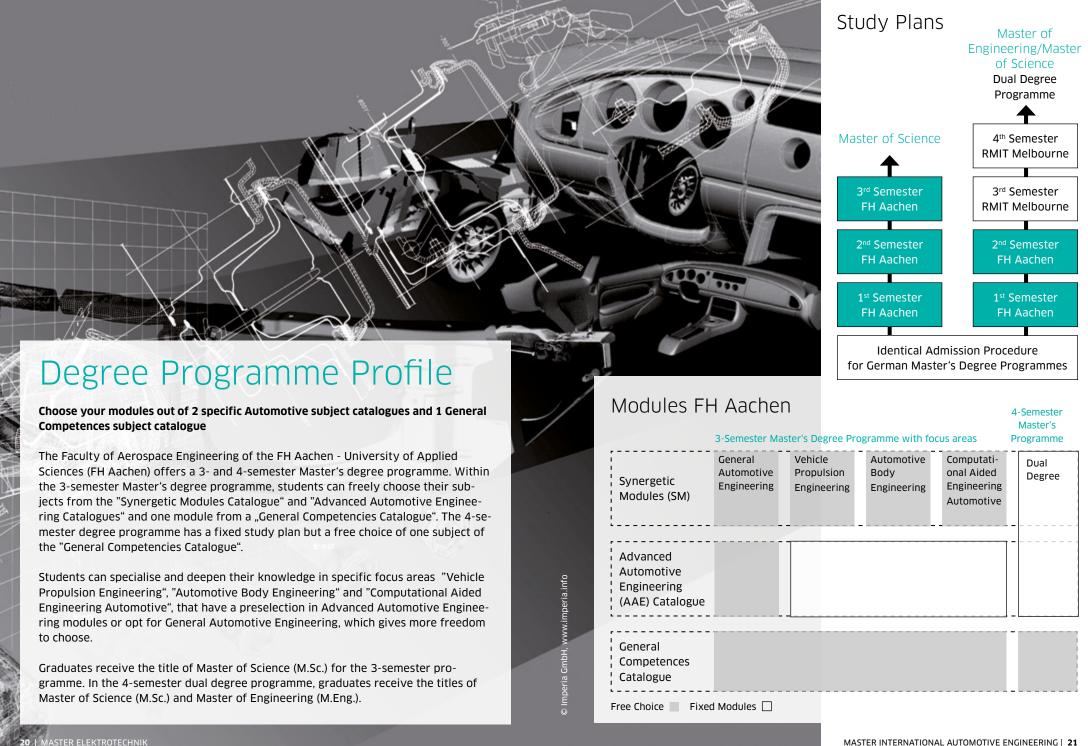
- Applicants, whose university entrance qualifications were not acquired at a German-speaking university, have to provide proof of knowledge of the German language: Goethe Certificate A2 for the admission to the degree programme, and Goethe Certificate B1 for the admission to the Master thesis.
- Applicants, whose university entrance qualifications were not acquired at a university in a country that participates in the Bologna Process have to send a certified copy of the "Graduate Record Examination (GRE) - General Test" results.
- Proof of English language skills (TOEFL/IELTS).

4-Semester Degree Programme

(Dual Degree Programme) Requirement of English language proficiency for RMIT enrolment:

- If you have studied for at least 2 years and your qualification is taught and assessed in English, you may be deemed to have met the English requirement (an official letter from the institution stating the degree programme is entirely taught and assessed in English must be submitted).
- Fachhochschulreife with, at least, the grade 3 ("Befriedigend") in English, or, Abitur with at least 7 points in English, or, DAAD language test with a minimum of B grades in all sections (completion within 5 years of RMIT program commencement).

Detailed information can be found at fhac.de/bewerbung-iav.



Curriculum 3-Semester Degree Programme

Name of Module	C/E	GAE Cr	CAEA Cr	VPE Cr	ABE Cr
1st Semester (SuSe) or 2nd Semester (WiSe)		Ci	Ci	Ci	U
Synergetic Catalogue (SM)	E	10	15	15	10
Advanced Automotive Engineering Catalogue (AAE)	E	20	10	16	15
General Competencies Catalogue (GC)	E	0	5	0	5
	Total	30	30	30	30
2 nd Semester (SuSe) or 1 st Semester (WiSe)		,			
Synergetic Catalogue (SM)	E	10	15	5	15
Advanced Automotive Engineering Catalogue (AAE)	E	15	15	20	15
General Competencies Catalogue (GC)	E	5	0	0	5
	Total	30	30	30	30
2 nd Semester (SuSe) or 1 st Semester (WiSe)					
Master Thesis	C	29	29	29	29
Colloquium	С	1	1	1	1
	Total	30	30	30	30
	Total cp	90	90	90	90

GAE = General Aerospace Engineering

CAEA = Computational Aided Engineering Automotive

VPE = Vehicle Propulsion Engineering

ABE = Automotive Body Engineering

SuSe = Summer Semester

WiSe = Winter Semester

The descriptions of contents of the study modules are available online.

CR: Credits C: Compulsory E: Elective

L: Lecture

T: Tutorial

Lab: Laboratory

SWS: Contact hours per week

SU: Seminar

Elective Modules

			sws				
Name of Module	C/E	CR	L	Т	Lab	SU	Σ
Summer Semester Synergetic Modules							
Control System Design	E	5	2	1	1	0	4
Advanced CAD Methods	E	5	0	0	4	0	4
Neural Networks and Artificial Intelligence	E	5	2	1	1	0	4
Design of Experiments and Process Optimization	Е	5	2	1	1	0	4
Summer Semester Advanced Automotive Engineering	g Modi	ules					
Vehicle Structures - FEM	E	5	1	0	3	0	4
Electronics for Autonomous and							
Connected Vehicle Mobile Systems	E	5	2	1	1	0	4
Automotive User Interface Design	E	5	2	1	1	0	4
Environmental Impact of Vehicle Propulsion Systems	E	5	2	1	1	0	4
Design of Electronic Powertrain Management	_		_			_	_
Systems	E	5	2	1	1	0	
Winter Semester Synergetic Modules							
Structural Dynamics	Е	5	2	1	1	0	4
Advanced Finite Element Methods	E	5	2	1	1	0	4
Applied Computational Fluid Dynamics	Е	5	2	0	2	0	4
Composite Design and Manufacturing	E	5	2	1	1	0	4
Winter Semester Advanced Automotive Engineering	Modul	es					
Vehicle Interior - Simulation and Evaluation	E	5	1	3	0	0	4
Vehicle Acoustics	E	5	2	1	1	0	4
Global Automotive Homologation	E	5	2	0	0	2	4
Powertrain Calibration Propulsion Systems	E	5	2	1	1	0	4
Electrified Vehicles Components Modelling	E	5	2	1	1	0	4
Climate Change Impact on the Automotive Sector	Е	5	3	0	0	1	4

The descriptions of contents of the study modules are available online.

CR: Credits

L: Lecture

C: Compulsory T: Tutorial

E: Elective Lab: Laboratory SWS: Contact hours per week

SU: Seminar

Curriculum 4-Semester Degree Programme

Example for the commencement of studies in the winter semester in Aachen

			SWS				
Name of Module	C/E	CR	L	Т	Lab	SU	Σ
General Competences							
Engineering meets Design	Ε	5	0	0	0	4	4
General Management of Automotive and							
Aerospace Suppliers	E	5	2	2	0	0	4
Technisches Deutsch	Е	5	0	0	0	4	4
Critical Thinking and the Scientific Method	Е	5	0	0	0	4	4
Intercultural Communication	Е	5	0	0	0	4	4
Transforming Urban Mobility	Е	5	0	0	0	4	4
Other Faculty electives	Е	5	0	0	0	4	4

					SWS		
Name of Module	C/E	CR	L	Т	Lab	SU	Σ
1 st Semester (Winter Semester, FH Aachen)							
Advanced Finite Element Methods	С	5	2	1	1	0	4
Applied Computational Fluid Dynamics	С	5	2	0	2	0	4
Vehicle Acoustics	С	5	2	1	1	0	4
Global Automotive Homologation	С	5	2	0	0	2	4
Powertrain Calibration Propulsion Systems	С	5	2	1	1	0	4
	Total	30	-	-	-	-	

2 nd Semester (Summer Semester, FH Aachen)							
Control System Design	С	5	2	1	1	0	4
Advanced CAD Methods	С	5	0	0	4	0	4
Vehicle Structures - FEM	С	5	1	0	3	0	5
Automotive User Interface Design	С	5	2	1	1	0	4
Environmental Impact of Vehicle Propulsion Systems	С	5	2	1	1	0	4
Design of Electronic Powertrain Management Systems	С	5	2	1	1	0	4
	Total	30	-	-	-	-	

The descriptions of contents of the study modules are available online.

CR: Credits C: Compulsory E: Elective L: Lecture T: Tutorial

Lab: Laboratory

SWS: Contact hours per week SU: Seminar

The descriptions of contents of the study modules are available online.

CR: Credits L: Lecture

C: Compulsory T: Tutorial

E: Elective Lab: Laboratory SWS: Contact hours per week

SU: Seminar



Modules FH Aachen

Advanced Control Technology (61901)

- > Design of Advanced Control Systems
- > Identification of Dynamic System
- > Soft-computing Methods in Control Technology
- > Numerical Simulation and Optimization of Control Systems

Control System Design (67101)

- > State space systems
- > Multi-input multi-output (MIMO) control and optimal control
- > State observation
- > System identification
- > Nonlinear control

Advanced CAD Methods (67102)

- > Modelling of wireframe structures
- > Mathematical description of curves and surfaces
- > Modelling of advanced surfaces and shapes
- > Modelling of full-parameterized parts
- > Analyzing and evaluating of surfaces

Neural Networks and Artificial Intelligence (67103)

- > Neural networks, machine learning, Big Data
- > Supervised and unsupervised learning
- > Application, visualisation and analysis of data

Design of Experiments and Process Optimization (67104)

- > Objectives, design variables, factors, factor levels
- > Full factorial experimental designs and screening experimental designs
- > Multiobjective optimization via genetic algorithms

Structural Dynamics (67105)

- > Creation of damping and mass matrices within the finite element method (FEM)
- > Modal analysis using FEM and experiment as a basis for structural analysis
- > Calculation of the forced vibrations proportional and non-proportionally damped linear vibration systems
- > Explanation of structural nonlinearities and extension to nonlinear FEM calculations

Advanced Finite Element Methods (67106)

- > Derivation of a finite element formulation for static problems
- > Nonlinear material behaviour (creep and plasticity)
- > Treatment of contact problems
- > Basic introduction into stability problems
- > Heat transfer and the corresponding thermal stresses

Applied Computational Fluid Dynamics (67107)

- > Derivation and discretization of the conservation equations for fluid dvnamics
- > Solution methods for discretized partial differential equations
- > Grid generation and turbulence modelling
- > Examination of CFD results
- > Guided CFD tutorials and final CFD project work with presentations

Composite Design and Manufacturing (67108)

- > Material characteristics and mathematical material modeling
- > Guide lines for lightweight design using monolithic composites and sandwich structures
- > Analytical and numerical procedures for strength assessment and manufacturing engineering
- > Part design, strength evaluation and manufacturing engineering using realistic industry examples

Vehicle Structures - FEM and Testing (67301)

- > Functional attributes in FEM simulation and real world testing for automotive body structures
- > Design and optimization for crashworthiness, NVH (noise/vibration/ harshness) and durability
- > Planning and executing structural test and performing FEM-simulation with **Hyperworks**
- > Understanding the meaning of simulation and testing in the development of vehicles advanced automotive

Electronics for Autonomous and Connected Vehicle Systems (67302)

> Types of electrified vehicles components

- > Electrified vehicles components function specification
- > Mathematical description and modelling of electrified vehicles components
- > Electrified vehicles components control
- > MIL, SIL, HIL, RCP methods in components development
- > Application and calibration processes, model-based development

Automotive User Interface Design (67304)

- > Fundamentals: Anthropology, human cognitive ergonomics, human perception and information processing
- > Requirements and development methods for interaction elements such as touch screens and buttons
- > Usability and user experience
- > Development of interaction and display concepts (HMI) for the application in the vehicle and in the digital vehicle ecosystem
- > Evaluation of user interface and interaction by application of appropriate methods
- > Effects of and requirements caused by mega trends

Environmental Impact of Vehicle Propulsion Systems (67304)

- > ICE characteristics/engine maps
- > Pollutant formation
- > Modern combustion processes fossil/ non fossil fuels
- > Exhaust aftertreatment concepts
- > Euro7 emission standards
- > Impact of natural gas and fuel cell powered vehicles
- > Sustainable hydrogen off highway powertrains
- > Adaptation to eFuels (regenerative fuels)
- > Functional safety for regulatory compliance

Design of Electronic Powertrain Management Systems (67305)

- > Software structure of engine management systems
- > Interaction of power train control and different vehicle control units
- > Design of new or redesign of existing functionalities in engine management systems

Vehicle Interior - Simulation and Evaluation (67306)

- > Fundamentals: human anthropometry and physical ergonomics, vehicle interior standards and package, statistical analyses, Design of Experiments
- > Requirements and development methods for the ergonomic design of the vehicle interior
- > Conceptualization of vehicle interior and its components in an ergonomic wav
- > Evaluation of the vehicle interior and usage by the application of appropriate methods
- > Simulation with the digital human modeling software RAMSIS
- > Preparation, conduct and analysis of a customer study

Vehicle Acoustics (67307)

- > Fundamentals: sound. sound-field. parameters and definitions
- > Perception of humans: audibility of airborne noise, perception of structureborne noise
- > Measurement equipment: sensors, devices and chambers, analysis methods
- > Legislation: pass-by noise test, source analysis, test vehicles
- > Sources, transfer and radiation, reduction measures
- > Psychoacoustics: parameters, measuring and analysis techniques, sound engineering

Global Automotive Homologation (67308)

- > Vehicle homologation process
- > Vehicle type approval
- > Product liability
- > Homologation documentation
- > Main items of existing and in force coming European rulemaking with respect to safety and powertrain items

Powertrain Calibration Propulsion Systems (67309)

- > Calibration of engine management systems
- > Vehicle calibration
- > Application of rapid SW- Prototyping tools
- > On board diagnostics
- > Testing of control functions in engine management systems

Electrified Vehicles Components Modelling (67310)

- > Mathematical description and modelling of components and transmission
- > Transmission control unit (TCU) development
- > MIL, SIL, HIL, RCP methods in transmission development
- > Transmission application and calibration processes
- > Model based transmission optimization

Climate Change Impact on the Automotive Sector (67311)

- > Knowledge of climate, weather and scientific fundamentals of climate change and consequences in Europe
- > Power generation and distribution for the mobility sector, overview of atmospheric chemistry
- > Basics of weather phenomena close to the road
- > NGO and legislative body handling of climate change consequences

Modules Royal Melbourne Institute of Technology

Automotive Systems and Control (AUTO1029)

- > Describe, investigate and analyse complex systems in engineering and associated issues (using systems thinking and modelling techniques)
- > Develop creative and innovative solutions to engineering problems
- > Comprehend and apply advanced theory-based understanding of engineering fundamentals and specialist bodies of knowledge in the selected discipline area to predict the effect of engineering activities
- > Apply underpinning natural, physical and engineering sciences, mathematics, statistics, computer and information sciences
- > Demonstrate effective team membership and team leadership
- > Assess, acquire and apply the competencies and resources appropriate to engineering activities

Advanced Vehicle Dynamics (AUTO1927)

> This course will teach how engineers analyze vehicle dynamics in performance, handling and ride modes. Mastery of these techniques will enable to better predict dynamic behaviour of

a vehicle, and thus reconcile competing demands inherent in the design of vehicles.

Management of Automotive Design and Development (AUTO1024)

- > Product life-cycle management
- > Global design and communication (e-design)
- > Automobile system design
- > Safety regulations and design for safety
- > Car body design (structural and aerodvnamic)
- > Design integration and optimization

Research Methods in Engineering (OENG1120)

- > Development of skills to undertake a comprehensive literature review and research project plans.
- > This course introduces the general principles, methodologies and practices of data collection (both qualitative and quantitative) and analysis in qualitative research, analytics, content analysis, design aspects and research ethics.
- > Data analysis tools will be covered as well as understanding the validity and reliability of data.

 Development of skills in communicating scientific findings including writing academic publications and presentations.

Master's Research Project Part 1 & Part 2 (OENG1089/1090)

- > Designed to consolidate an expand knowledge through an in-depth experiment it analytical study of technical an engineering management application.
- > Work on research projects individually or in small groups
- In this courses it will be required to plan, manage and complete a research project, conduct a critical analysis of relevant literature, undertake research work to a high level standard of professional engineers and researchers, evaluate and report the research findings.
- > It is a work-integrated project done either in conjunction with industry or in a simulated engineering work environment.

Starte Deine Idee

Hast Du eine Idee in der Schublade und weißt nicht wie Du sie umsetzen sollst? Starte Deine Idee und komm zum Gründungszentrum. Gemeinsam können wir Deine Idee beleben und ihr zum Erfolg verhelfen.



gruenden.fh-aachen.de



ıııl GRÜNDUNGSZENTRUM FH AACHEN

FH Aachen -University of Applied Science and Faculty

FH Aachen University of Applied Sciences, with its locations in Aachen and Jülich, is one of the biggest and most important universities of applied sciences in Germany. The competences are mainly in the future areas of energy, mobility, and life sciences. The latest research results are directly incorporated into teaching. With a variety of laboratories, wind tunnels, a powertrain laboratory and an astronautic laboratory, FH Aachen is able to teach with a very high practical orientation. A further decisive step is offering international degree programmes. Here, the language of instruction is English. In this context, the cooperation with numerous and significant foreign partner universities of the FH Aachen is particularly attractive.

RMIT - University



Royal Melbourne Institute of Technology (RMIT) is a global university recognised for leadership and innovation in technology, design and enterprise. As a QS 5-Star rated institution, RMIT is ranked as one of the world's leading universities with a strong research record and state-ofthe-art facilities and infrastructure. Whether you complete your degree in Australia or on exchange anywhere in the world, RMIT aim to provide students with the best experience possible along with the skills to succeed in their chosen career.

RMIT is one of Australia's top 5 universities for students to go on an international exchange as part of their studies. With campuses in Melbourne and Vietnam as well as access to over 150-plus partner institutions, studying at RMIT puts the world at your fingertips. When you study at RMIT in Melbourne you are part of a vibrant and welcoming university. RMIT has over 100 student clubs, societies and collectives to choose from which are a great way to meet new friends, develop new skills and connect with people who share your interests. You can even start your own club. Safe, multicultural, and voted the world's most liveable city seven years in a row (2017 Economist Intelligence Unit Global Livability Ranking) - Melbourne is a great place to live and study.

RMIT's City campus is in the heart of Melbourne's central business district, close to public transport, accommodation and surrounded by a vibrant food and coffee culture. You can explore Melbourne's beautifully maintained public spaces, a network of laneways, iconic galleries and museums, as well as a lively year-round calendar of sports, music, fashion and cultural events. Melbourne is a stimulating and exciting city to be in.



When can I apply for the degree programme and how?

Please apply via our online application portal. It will be opened a few weeks before the deadline for international applicants, 4 weeks at the latest.

Do I have to submit an English language certificate?

In case you are a native speaker or you are able to provide an official statement from your university concerning the fact that your entire undergraduate studies have been taught in English, you do not have to submit TOEFL/IELTS/FCE.

Is it possible to attend a German language course at the same time as the Master's degree programme and submit the certificate later?

It is only possible for the B1-course. Without the required language certificates at the time of enrolment, your admission will become invalid. There is no possibility to get conditional approval. We do not offer special language courses as preparation for the B1 examination. Are all courses taught in English?

Yes, except for Technical German.

How to submit the documents?

Please upload all required documents during your online application. Do not send any documents postally or via ETS.

Do I need GRE?

If you have completed your undergraduate studies at a university that is not a member of the Bologna Process, you have to provide GRE. You will find all Bologna participants on the following page: www.ehea.info/pid34249/members.html India is not a member of the Bologna Process.

Organisation

Any information about

- > duration and start of the degree programme
- > course fee
- > modules' description and list of lectures
- > application documents and deadlines

and any further information will be published on the website.

Please use the following web address to get further information. fhac.de/master-automotive-engineering



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