

# Automotive Engineering

RUB Summer School 2019

# Germany: Country of Automotive Engineering

## Trends and Fields of Research



Welcome to the Ruhrgebiet, a metropolitan area of several cities with some of the best universities of the country and one of the hotspots of car engineering in Europe. Take the opportunity to gain knowledge in current research topics, get to know leading experts in car engineering and connect with students from all over the world.

We want to show you how we put science into everyday life with our competitive solar car as well as the racing car developed by our students in an international competition.

Fun activities in the area will help you bond with your fellow students and build relationships for your professional life after university.

Glück auf from Bochum!

# Week 1 Introduction and Materials

## 1. Introduction

### Current trends in automotive engineering

From automated driving to super light weight materials and interconnected cars – discover the current trends in automotive engineering.

### Modeling of vehicle dynamics

New modeling structures help analysing modern chassis' reactions to driver inputs and road conditions

### Introduction to drive technologies

Overview on the function and construction of drive technologies

## 2. Materials

### Materials and Processes for light body structures

Light weight materials play an important role in alternative drive technologies. Learn about the structures and challenges of materials and processes for light body structures.

### Materials and Processes for wear-resistant engine tribosystems

New materials are needed for environmental protection, resource utilization and customer satisfaction. This session will teach you about new tribo-materials, which run at higher temperatures and velocity conditions.

# Week 2 Engines

## 3. Combustion Engines

### Processes in Internal Combustion Engines

Refresh your knowledge of internal combustion engines. From 2- to 6-stroke engines, different ignition processes and the question of efficiency, get an overview of the function and advantages of the classic car engines.

### Automotive Transmissions

As one of RUB's major fields of research, the insights into automotive transmissions are especially fascinating. Discover new trends and gain know-how about the challenges of modern motor-vehicle transmission.

## 4. Alternative Engines

### Alternative Drive Technologies

From hybrid solutions, to fuel cell technology to electric cars – alternative drives have a long history already, but as climate change and rising oil prices change our perception of the internal combustion engine, automotive engineers have been working on interesting alternative drive technologies.

### Electric Vehicles – The Future of Automotive Engineering?

Air pollution, global warming – and Elon Musk – have helped the electric vehicle to gain the attention of some of the best researchers. Learn more about challenges and the current developments to tackle them.

# Week 3 Driver Assistance Systems

## 5. Electronics

### Active Safety and Driver Assistance Systems

Human failure is the cause for most accidents. Modern driver assistance systems are built to make driving much safer.

### Automated Driving

Reading your mails on the way to work? Working on the reality of this dream at TU Dortmund

### Case Study: Volkswagen Cars

Infotainment and Connectivity in Volkswagen Cars in the Era of the Internet of Things.

## 6. What comes next?

### Side Channel Analysis for Automotive Security

The Internet of Things bears risks of hacking that researchers at RUB take into account and meet with the development of crypto-methods in this exciting project.

### A look into the crystal ball

How will the future of car engineering look like? Will electric vehicles take over the market? Might individual driving be a thing of the past? Discuss with leading researchers how this field of engineering will develop.

# Leisure Activities

Welcome to one of the most exciting parts of Germany!

Aside from offering new skills for your studies, RUB Summer Schools also focus on getting to know your fellow students and discovering the area.

We are planning a **barbecue**, want to take you on a **pub-crawl** into the famous Bermuda Triangle of Bochum (no worries, no one will get lost there) and test your driving skills on a **cart-track** nearby.

The highlight of your stay might be the **Classic Remise** in our county's capital, Düsseldorf. It displays the most beautiful cars of the last decades while offering fine Italian dining at the same time. The city is called the longest pub of the world and we want you to find out why.





# RUB Summer Schools

Study – Connect – Enjoy