

**Código da Disciplina:** TE 845

**Nome:** Tópicos Avançados em Sistemas Eletrônicos (Mecatrônica Automotiva).

**Carga horária:** 30 horas.

**Número de Créditos:** 02

**Período de Aulas:** 9 de setembro a 27 de setembro de 2013

**Horário:** segunda a sexta , das 13:30 h às 15:30 h

**Ementa:** Variável, versando sobre tema de interesse da área de sistemas eletrônicos.

(Structure and components of automotive mechatronic systems, dynamic behaviour of the vehicle motion, design of mechatronic systems which are used for influencing the vehicle motion)

**Plano de Ensino:**

**Período Letivo:** 2º Semestre de 2013 (setembro e outubro), ministrado em 2 aulas teóricas de 45 min (total 90min) por dia, durante 15 dias e mais 5 aulas práticas de 90min.

**Professor Responsável:** Prof. Dr. Harald Göllinger da Universidade de Ciências Aplicadas de Ingolstadt – Bavária (HAW-Ingolstadt)

**Programa: Ministrado em Inglês**

Prof. Dr. Harald Göllinger

**Automotive Mechatronic Systems and Vehicle Dynamics**

What do you need to build a driver assistance system (e.g. ABS) that works in a car?

Which sensors do you need? How do the sensors talk to an electronic control unit

(ECU) in a car? How do you influence the car dynamics? How do you talk to the

Onboard Diagnosis? How do you develop software in an automotive application?

How are we going to drive a car in the future?

**Objectives**

-Acquire knowledge of the structure and components of automotive mechatronic systems

-Analyze the dynamic behaviour of the vehicle motion

- Understand the design of mechatronic systems which are used for influencing the vehicle motion.

**Benefits**

· Acquire a comprehensive survey of the functionalities of automotive mechatronic systems

· Get to know the structures of automotive mechatronic systems and the control of vehicle dynamics

· Overview of automotive mechatronic systems: sensors, bus systems, electronic control units, actuators.

· Driver assistance systems for the longitudinal motion of a car: models, transfer functions, state space representation and applications (antilock brake system, traction control...)

· Mechatronic systems for influencing the vertical and lateral motion of a car,

· Exercises and simulations.

**Content**

-Basic Structures of automotive mechatronics: Definition and examples, mechanic and electronic systems, levels of information processing, intelligent systems (2 hours)

- Modelling: mathematical models, building blocks of mechanical systems, of electrical systems, of pneumatic and hydraulic systems (2 hours)
  - Sensors: sensor integration, automotive sensors for position, velocity and acceleration, pressure and flow(4 hours)
  - Actuators: electromechanic, pneumatic and hydraulic actuators, PWM signals Simulink: model of a DC motor (4 hours)
  - Process control: microcontroller, real time operating systems, electronics, A/D-converters (4 hours)
  - How do we get an algorithm running in a microcontroller? Digital control systems, state space, observer,state machines (4 hours)
  - Automotive bus systems like LIN, CAN, MOST Diagnosis (OBDII) Lecture, Canalyzer, OBD diagnosis (8 hours)
  - Automotive applications:  
Simulation of sky hook, ABS, ASC, speed control, electromagnetic valve, ...  
Simulink (8 hours)
  - Electric and hybrid cars: the future of automobiles (2 hours)
- \* In Germany a lecture hour is 45 minutes.

**Prerequisites:**

Control theory: linearization, Laplace transform, stability, state space representation