GENERAL AND THEORETICAL ELECTRICAL ENGINEERING

COURSES

- Fundamentals in electrical engineering
- Electromagnetic fields and electrodynamics
- Computational electromagnetics

RESEARCH

- Electromagnetic and optical metamaterials
- Nanophotonics and plasmonics
- Optical interconnects

APPLICATIONS

- Automotive technology
- Medical technology
- Computer engineering
- Photonics

CONTACT

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The Laboratory for General and Theoretical Electrical Engineering (ATE) is involved in a broad range of research activities covering topics in both fundamental and applied engineering science. Prof. Dr. Daniel Erni and his team of 9 scientific staff are members of CeNIDE and actively participating in an informal medical engineering research network at UDE.

The courses offered by the laboratory include lectures in theoretical electrical engineering, electrodynamics, and computational electromagnetics, as well lab courses in electronic circuit design (electronic workshop for students) and electromagnetic field simulation (CoFT-Lab).

The current research of the laboratory encompasses activities in the realm of electromagnetic and optical metamaterials with a specific emphasis on innovative antenna designs. Additional research fields include optical interconnects at highest data rates, nanophotonics and metal-based nano-optics (plasmonics), as well as new methods for computer-guided device design based on numerical structural optimization.

In the framework of various collaborative research projects the laboratory is developing low-cost microwave antennas for advanced automotive applications and multi-functional RF coils for high-field magnetic resonance imaging (MRI) including advanced schemes such as travelling-wave MRI. Further investigations comprise a study for the German Navy dealing with the electric current flow around marine vessels stemming from the cathodic corrosion protection system. Additional studies are carried out in biomedical engineering addressing e. g. microfluidic chip-based ultra-fast cell sorters and the electromagnetic/optical analysis of biological tissues and nanocomposites.