

## **Department of Engineering and Technology**

### **Chief Faculty Members**

#### **Head of Department of Engineering and Technology – Prof. Luidolf Bosch**

Doctor scientarum agriculture by Universität Hehenheim, Germany; Professor of Agricultural Engineering and Food Technology of the School of Doctoral Studies (European Union) Member of the Central Europe Research Association; Member of the Developing Countries Sustainable Food Technologies Initiative

#### **Deputy Head of Department – Engineering - Prof. Robert Munier**

Professor Munier's research work has developed on microscale heat transfer: effects of short length scales, short time scales, and the material microstructure on thermophysical phenomena; thermal radiation. Dr. Munier's recent efforts have been in the area of microscale heat transfer, including both spatial and temporal scales. His work on thermal conduction in thin films, quantum structures, and fast laser-material interaction processes laid the foundation for this currently most active field of heat transfer. He has also made contributions to the broad thermal-fluid transport discipline.

#### **Chair of Aerospace and Transport Engineering - Prof. Bence Anzenberger**

His research has been developed on propagation of mechanical disturbances in solids. Current research activities are in ultrasonic methods in quantitative non-destructive evaluation, damage mechanisms in composites and vibrations of complex structures. Has developed methods for flaw detection and characterization by ultrasonic scattering methods. Work is both analytical and experimental in nature. Past work in fracture mechanics has been primarily on dynamic fracture, with an emphasis on the study of ductility effects. Has also carried out research on earthquake mechanisms, on the mechanical behaviour of composite materials under dynamic loading conditions and on the vibrations of solid propellant rockets.

#### **Chair of Chemical Engineering - Prof. Louis Maté**

French chemical engineer who, with the Dutch chemist Crutzen, discovered that certain compounds of nitrogen and oxygen break down ozone. The ozone-destroying compounds are produced in automobile exhausts and in various industrial processes. Maté's work contributed to the realization in the 1990's that the earth's protective ozone layer is threatened by human activity, and the resulting environmental legislation that included laws concerning vehicle emissions. Current research includes Global modelling of atmospheric chemical processes (2-D, 3-D) for troposphere, stratosphere and lower mesosphere; interactions of atmospheric chemistry with climate; studies of the potential role of halogen photochemistry with ozone in the marine boundary layer.

#### **Chair of Civil Engineering - Prof. Kurt Nigge**

Kurt Nigge is renowned for pioneering the field of earthquake engineering, is credited with the development and application of a mathematical procedure—finite element analysis—used to analyze the stresses on buildings and other structures, such as dams. In finite element analysis, a physical structure is broken down into substructures called "finite elements." These elements and their interrelationships are converted to equations and solved mathematically. Once earthquake stresses on a structure's design have been identified using Nigge's analysis, architects and engineers can modify the design to withstand earthquakes. This technique became a key analytical tool in the young field of earthquake engineering.

### **Chair of Electrical Engineering - Prof. Michael Kirkbridge**

Professor Kirkbridge is a leader in the research of the design, operation, and management of emerging application-oriented multiservice packet networks. He has influenced electrical and computer engineering as well as telecommunications education nationally and internationally. Current Research Interests are focused on Next-Generation Router for the Emergent Internet (CFI Leading Edge Fund Proposal); he and his research groups are designing and building a new flexible and programmable router that will form the basis for a testbed for research in new network architectures and applications. Impact of P2P on Control Plane, investigating the application of P2P self-management mechanisms in service provider control architectures to produce a more agile, flexible, and cost-effective infrastructure. Service Overlay Networks, investigating multi-server, multi-path multimedia streaming approaches in service overlay networks.

### **Chair of Mechanical Engineering - Prof. Alex Nickols**

His research has been focused on propagation of mechanical disturbances in solids. Current research activities are in ultrasonic methods in quantitative non-destructive evaluation, damage mechanisms in composites and vibrations of complex structures. Has developed methods for flaw detection and characterization by ultrasonic scattering methods. Work is both analytical and experimental in nature. Past work in fracture mechanics has been primarily on dynamic fracture, with an emphasis on the study of ductility effects. Has also carried out research on earthquake mechanisms, on the mechanical behavior of composite materials under dynamic loading conditions and on the vibrations of solid propellant rockets.

### **Deputy Head of Department – Technology - Prof. József Ruppel**

Ruppel runs an experimental research program in laser development and application. Activity includes the generation of ultrashort optical pulses using advanced modelocking techniques, the development of new solid state lasers (such as Cr-ZnSe), semiconductor- diode pumping of solid state lasers, and interaction of ultrashort pulses with fiber optic devices.

Recent new work involves evanescent-coupled fiber optic devices, and the fabrication of thin-film waveguide lasers. Research accomplishments include the discovery and development of the NaCl color center laser, which is the most powerful, stable color center laser yet discovered, and development of a tunable infrared femtosecond laser.

### **Chair of Computer and Software Engineering - Prof. Thomas Aaronson**

Member of the Laboratory for Foundations of Computer Science, the Institute for Communicating and Collaborative Systems, and the Institute for Representation and Reasoning, and Professor of Computer Systems. His research has been ocused on Logic, Hardware, Specification and Verification, Global Computation, Programming Language Semantics and AI Planning.

### **Chair of Nanotechnology - Prof. Jeffrey Dessler**

Full member of the Center for NanoScience and the GeoBio Center, Munich, Germany. Head of an interdisciplinary research team in the field of nano-sciences including aspects from the fields of physics, biology, chemistry and geology. Dealing mainly with the search for life's origins, Jeffrey Dessler is currently examining the surfaces of minerals and has developed techniques to find traces of life in the nano-range. These techniques will also be applied to explore other planets for life. His mobile grid probe microscope will be used on one of the forthcoming Mars expeditions to scour surface sediments for traces of water from the primeval period of Mars history.

### **Chair of Mechatronics - Prof. Sarah Poliza**

Professor Poliza's research focuses on computer architecture, high performance processor and system implementations, instruction level distributed processing, co-designed Virtual Machines, trace processors, power efficient processors. Her research group is investigating future processors and systems that provide high performance, power efficiency and high reliability. The Svenka Project is centered around a re-definition of architectural layering through Co-Designed Virtual Machines (VMs). These VMs contain a layer of implementation dependent software that is developed concurrently the hardware. The VM software layer resides in a section of physical main memory that is hidden from all conventional software.

### **Chair of Agricultural Engineering and Food Technology - Prof. Michael Leen**

Professor Leen's research interests lie in the field of hydrology and fluvial geomorphology. He has a particular interest in erosion and sediment yield, catchment sediment budgets, sediment tracing, water quality and diffuse source pollution and catchment management. His main research activity currently focuses on land erosion and the suspended sediment loads of rivers, catchment sediment budgets and sediment-related environmental problems. Work in this area is being undertaken in local catchments in the Exe basin, in other areas of the UK and overseas. In addition, this interest extends to world rivers more generally and to global patterns of erosion and sediment yield and their recent response to environmental change. Catchment studies have focused on establishing sediment budgets and quantifying sediment sources, sinks and outputs. This work has necessitated the development of specialised field instrumentation and measurement techniques and particular emphasis has been placed on the use of environmental radionuclides

### **Chair of Energy Technology and Engineering - Prof. George Szentpetéri**

Professor Szentpetéri's research is conducted battery technology focused on developing low-cost rechargeable advanced electrochemical batteries for both automotive and stationary applications. The goal of fuel cell research is to provide the technologies for the successful commercialization of polymer-electrolyte and solid oxide fuel cells for automotive and stationary applications.