

A background image of a sound wave composed of white dots and a bright horizontal line, set against a dark blue gradient.

# INFORMATION FOR APPLICANTS

Two Full Professor positions:

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**COMMUNICATION ACOUSTICS**

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**ACOUSTICS AND ENVIRONMENTAL NOISE**

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Graz University of Technology, Austria

> [www.tugraz.at](http://www.tugraz.at)



Markus Kaiser, Graz

## GRAZ UNIVERSITY OF TECHNOLOGY

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Graz University of Technology (TU Graz) is the oldest science and technology research and educational institute in Austria. For more than 200 years, it has been an important international center for research and teaching. The university focuses on five fields of expertise:

- Advanced Material Science
- Human & Biotechnology
- Information, Communication & Computing
- Mobility & Production
- Sustainable Systems

The university enjoys intensive collaborations with other national and international research and educational organizations as well as with business and industry worldwide.

Starting from February 1, 2023, TU Graz seeks to appoint two Full Professors. One „Communication Acoustics“ at the Institute of Signal Processing and Speech Communication (SPSC) and „Acoustics and Environmental Noise“ at the Institute of Fundamentals and Theory in Electrical Engineering (IGTE), which are part of the Faculty of Electrical and Information Engineering. Both positions are tenured according to Section 98 of the Austrian University Act. In this context, we are looking for individuals with an outstanding scientific track record who can represent the area of research and education, respectively.

The environment offered at the TU Graz is unique. There are strong faculties - in the field of acoustics, especially the faculties of Electrical and Information Engineering, Mechanical Engineering and Economic Sciences, and Civil Engineering Sciences - with internationally renowned researchers doing outstanding work in basic research as well as in industry-related research and who are and contribute significantly to the international success. TU Graz has an excellent study program in Audio Engineering, with the highest number of international students at the TU Graz. This study sustainably attracts many applicants and trains students who regularly win top positions in highly competitive international competitions. In addition, there are many non-university research institutes with an international reputation and dedicated sponsoring companies.



Graz Tourismus – Harry Schiffer

## ABOUT GRAZ

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Graz, the second largest city in Austria, is situated south-east of the Alps and enjoys an almost mediterranean climate and lifestyle. The location in a cultural borderland close to Slovenia, Hungary, and Italy is reflected in Graz' exceptional townscape. The medieval old town is one of the largest and best-preserved in central Europe and was named a UNESCO world heritage site. Its magnificent buildings bear witness to over 850 years of architecture in the city, such as the Landhaus, also home to the Styrian Armoury and its 30,000 weapons and suits of armour, the cathedral and the mausoleum, Schloss Eggenberg and the Grazer Burg with its double-spiral staircase. These ancient edifices merge harmonically with state-of-the-art works by internationally renowned architects such as for example the Kunsthaus Graz, Joanneumsviertel, MUMUTH or the greenhouses in the Botanical Gardens.

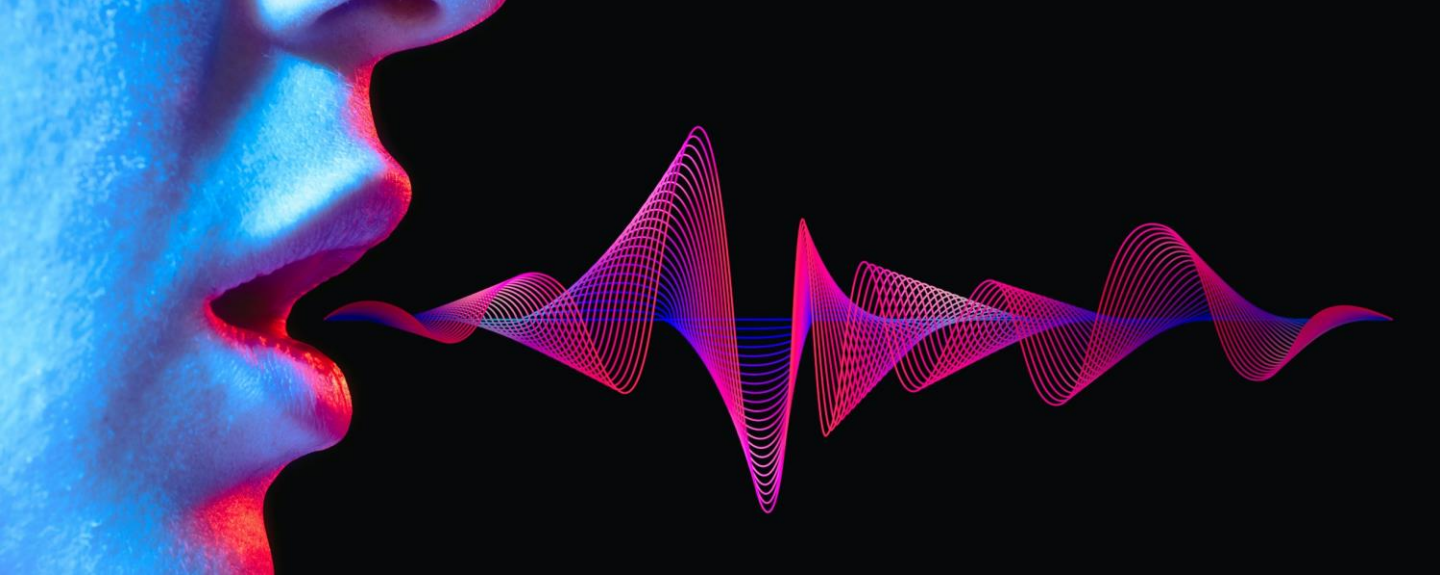
The rich offerings of Graz to its visitors are reflected by a number of awards: Graz was the "Europe Capital of Culture 2003", is a member of the "UNESCO City of Design" network, and was named the Austrian "Capital of Culinary Delights". Graz is also a young and lively city with more than 50.000 students enrolled into one of the six universities.

Graz is embedded into beautiful and diverse landscapes, with the wine growing region known as "Styrian Tuscany" in the south, a region rich of hot springs and spas in the east, and the Alps in the north and west.

### Facts and Figures about Graz:

- Residents (main domicile 01/01/21) – 294,236
- Universities - 6 universities | 2 polytechnics
- Students in Graz - over 50,000
- Total area – 127.5 km<sup>2</sup> (of which 50 % green area)
- Elevation - 353 m
- Museums – 34

> <https://www.graztourismus.at/en>



svetazi – AdobeStock

## FULL PROFESSORSHIP COMMUNICATION ACOUSTICS

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We are seeking a highly qualified and scientifically well-established person, deeply committed to representing the field of "Communication Acoustics " in teaching and research and who brings along experience in music. The professor will further develop the Bachelor's and Master's studies in "Electrical Engineering and Audio Engineering". This program is run jointly by the TU Graz and the University of Music and Performing Arts Graz and enjoys substantial international appeal.

The professor should develop excellent research in the field of communication acoustics:

- Electroacoustics, media systems, recording and reproduction engineering
- Hearing acoustics, hearing aids, speech and music perception
- Embedded audio, 'Hearables', virtual and augmented reality
- Acoustic measurements, engineering of acoustic materials and devices.

Cooperation is vital in research at TU Graz. Possible partners are the Professor of Acoustics and Environmental Noise, existing research groups in Signal Processing and Speech Communication, Multiphysics and Aeroacoustics, Electronics, Electronic Sensor Systems, and Technical Informatics. Furthermore, the neighboring Faculties are experienced partners in Noise-Vibration-Harshness, Soundproofing, Psycho-Acoustics in Transportation, and Visual Computing. Cooperation beyond the university (Institute of Electronic Music and Acoustics and the Department of Otorhinolaryngology) and company partners is recommended.

The fundamentals and areas of specialization will be part of the inter-university studies in "Electrical Engineering and Audio Engineering" (jointly with the University of Music and Performing Arts Graz). This study program includes the operation of a sound recording studio for teaching purposes and the supervision of graduation work for Bachelor's, Master's, and Ph.D. students.



## FULL PROFESSORSHIP ACOUSTICS AND ENVIRONMENTAL NOISE

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We are seeking a highly qualified and scientifically well-established person committed to the field of Acoustic and Environmental Noise in teaching and research. The focus will be on theoretical principles, fundamental technologies, and their applications. Extensive research knowledge in physical acoustics and interdisciplinary cooperation with the departments of electrical engineering, mechanical engineering, civil engineering, and medicine are expected.

The expertise of the applicants covers several of the following areas:

- Research into physical noise mechanisms at the source and simulation of propagation.
- Acquisition, transmission, processing and analysis of measurement data
- Physical and psychoacoustic assessment of noise emission and immission
- Technical and economic assessment of noise protection measures

The main application areas are road, aircraft, and rail traffic noise. In the long term, this professorship is to open up the application field of urban noise, particularly noise in residential areas, with the goal of "the quiet city" and the essential application field of traffic noise. In addition, the candidate should have excellent pedagogical and didactic skills, as well as a sustained interest in shaping the subject of acoustics for various degree programs, in particular for the study of "Electrical Engineering and Audio Engineering" and the development of a Master's program in "Engineering Acoustics".

Cooperation is a vital factor in research at TU Graz. Cooperation with the existing research groups of the Faculties of Electrical and Information Engineering, Mechanical Engineering and Economic Science, and Civil Engineering Sciences is desirable. Furthermore, the collaboration between the endowing companies, other universities, and research institutions is highly recommended. This cooperation should lead to the interdisciplinary field of "Acoustics and Environmental Noise" being covered in its entirety in both research and teaching.



TU Graz – Lunghammer

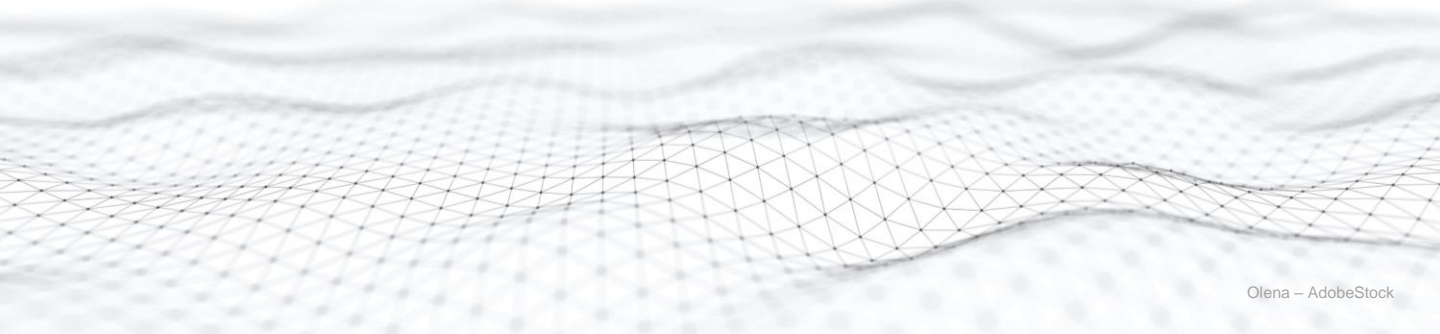
## GRAZ: VIBRANT RESEARCH LANDSCAPE IN ACOUSTICS

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The environment offered at the TU Graz is unique. There are strong faculties - in the field of acoustics, especially the faculties of Electrical and Information Engineering, Mechanical Engineering and Economic Sciences, and Civil Engineering Sciences - with internationally renowned researchers, doing outstanding work in basic research as well as in industry-related research, and who are and contribute significantly to the international success. On the following pages, institutes of the TU Graz of various faculties doing research in acoustics are presented in detail. The expertise and test facilities are outstanding and should contribute to future collaboration between the newly created professorship positions and the existing expertise.

TU Graz has a study program in Audio Engineering, which has the highest number of international students at the TU Graz. This study sustainably attracts many applicants. The program is based on a profound scientific and music-theoretical education. Students can select courses from fields like electrical engineering, acoustics, information technology, and audio technology, resulting in graduates with excellent interdisciplinary knowledge and skills. Especially, companies developing acoustical products seek for this special combination and knowledge. Alumnae of the study program work in various branches along the dividing line between music and technology, contributing their interdisciplinary skills in various ways.

In addition, there are many non-university research institutes with an international reputation and dedicated sponsoring companies. These companies are highly willing to collaborate with the TU Graz and the respective institutes as one of the top research institution in central Europe.



# ACOUSTICS EXPERTISE AT TU GRAZ

Besides the professorship at SPSC and IGTE, several additional research groups in Graz and institutes of TU Graz work on acoustics and offer a rich ecosystem for collaborations.

## Institute of Signal Processing and Speech Communication (SPSC)

In 2000, the SPSC Lab (Univ.-Prof. Dipl.-Ing. Dr.techn. Gernot Kubin, Univ.-Prof. Dipl.-Ing. Dr. mont. Franz Pernkopf, Ass.Prof. Mag.rer.nat. Dr. Barbara Schuppler) was founded as a research and education center in nonlinear signal processing and computational intelligence, algorithm engineering and circuits & systems modeling and design.

[www.spsc.tugraz.at](http://www.spsc.tugraz.at)

It covers applications in acoustics, speech/audio communication, telecommunications and wireless communications. Research at the SPSC Lab addresses fundamental and applied research problems in five scientific areas:

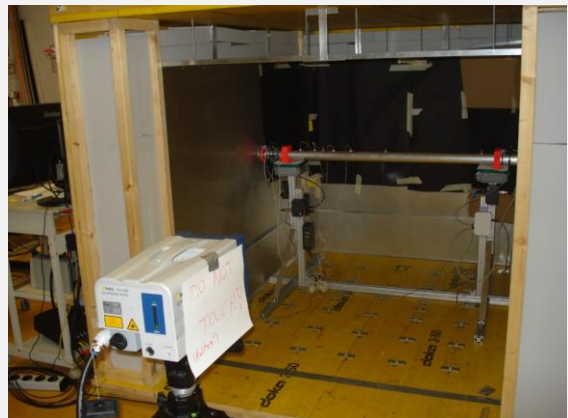
- Audio and acoustics
- Intelligent systems
- Nonlinear signal processing
- Speech communication
- Wireless communications

## Institute of Fundamentals and Theory in Electrical Engineering (IGTE)

At IGTE there is already an established research area Vibration and Aeroacoustics (headed by Ass. Prof. Stefan Schoder, deputy head of the Technical Committee for Flow Acoustics of DEGA). The head of the institute, Prof. Manfred Kaltenbacher is well anchored nationally and internationally in the field of acoustics (President of the ÖGA, and member of the board of the DEGA), member of the Technical Committee for Computational Acoustics of the EAA, member of the board of the ICA, Editor in Chief of the Journal Acta Acustica of the EAA, Editor of the Journal of Theoretical and Computational Acoustics).

[www.igte.tugraz.at](http://www.igte.tugraz.at)

In addition to a laboratory for the characterization of acoustic metamaterials, the area of modeling and simulation of sound source mechanisms and sound propagation is a major focus.



IGTE – TU Graz

The Institute (Univ.-Prof. Dr.-Ing. Franz Heitmeir, Assoc.Prof. Dipl.-Ing. Dr.techn. Emil Göttlich, Priv.-Doz. Dipl.-Ing. Dr.techn. Andreas Marn) is performing research in the field of gas turbines especially for aero engines and is one of the leading partners for the industry in terms of high speed tests of high pressure (transonic) turbine as well as low pressure turbine stages under Mach number similarity. Measurement campaigns are performed in the test rigs of the institute, e.g. the Subsonic Test Turbine Facility for Aerodynamic, Aeroelastic, and Aeroacoustic investigations (STTF-AAAI). Over more than 20 years of cooperation with different stationary gas turbine and aero engine manufactures (MTU Aero Engines, GKN

Aerospace, GE, Rolls Royce, GE Avio Aero, Turbomeca and Snecma) has led to a great experience in experimental und numerical research in the field of gas turbine aerodynamics, aeroacoustics, and aeroelasticity. Research at the institute is currently focused on low emission aero engines and contributes to reach the goals summarised in the Strategic Research and Innovation Agenda that requests for example that "The perceived noise emission of flying aircraft is reduced by 65%." Applied measurement techniques are microphones, fast response aerodynamic pressure probes, laser optical measurement techniques (PIV; LDV, LV), conventional pressure and temperature measurement techniques.

**Institute of Fluid Mechanics and Heat Transfer (ISW)**

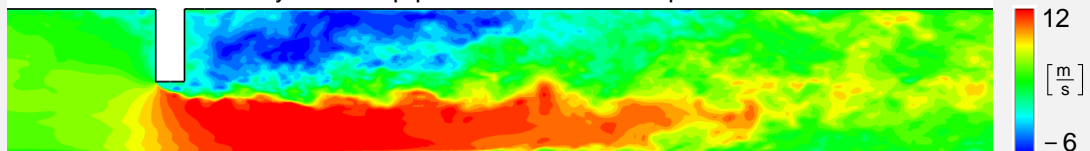
The institute ISW (Univ.-Prof. Dr.-Ing. habil. Günter Brenn, ao. Univ.-Prof. Dipl.-Ing. Dr. techn. Helfried Steiner) of the Faculty of Mechanical Engineering and Economic Sciences of TU Graz is known for teaching and research in incompressible and compressible fluid mechanics, as well as heat and mass transfer. The research of the four scientific groups of the institute covers all transport processes in continuum mechanics. The group devoted to modelling and numerical simulation has entered the field of acoustics using incompressible Computa-

tional Fluid Dynamics for providing acoustic source terms in low Mach number flow.

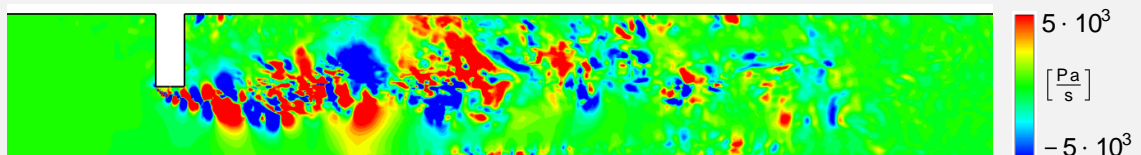
Teaching and research of the ISW cover the following scientific areas:

- Transport processes and rheology in multiphase flows
- Aerodynamics in mobility, buildings and sports
- Modelling and simulation of incompressible flows, without and with chemical reactions
- Interfaces and milli/micro fluid mechanics

Turbulent flow inside cylindrical pipe with halfmoon shaped obstruction



Instantaneous axial velocity



Instantaneous acoustic source term  $dp/dt$  for Perturbed Convective Wave Equation



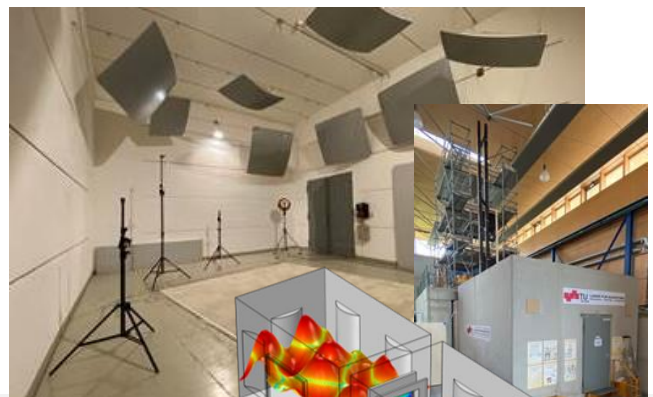
## Laboratory of Building Science (LFB)

Building and room acoustics is one of the three main research areas of the Laboratory for Building Science (LFB) headed by OR. Dipl.-Ing. Heinz Ferk. The other two research areas being hygro-thermal building physics and mechanical building physics. We provide outstanding technical support to your project underpinned by our modern laboratory infrastructure, and highly experienced team. We have more than 30 years of experience in the analysis of building acoustics including in situ measurements. Our empirical analysis is often conducted in combination with numerical simulation. The LFB is able to undertake a wide range of building acoustics, including for example, reverberation room measurements as well as bespoke measurement methods, which are developed and applied in accordance with the client's requirements. We have successfully delivered a number of high profile research projects with partners from other research organizations, industry and authorities. We work on the development and optimization of single components up to complete building systems, addressing complex acoustic challenges in building construction. The LFB is an European

[www.bauphysik.tugraz.at](http://www.bauphysik.tugraz.at)

notified body and an accredited acoustic testing laboratory according to EN ISO 17025. We are members of several ASI, CEN and ISO Standardization Committees and of the Expert Advisory Board of the Austrian Institute of Construction Engineering OIB.

Valuable synergies result from the integration of the LFB within the Institute of Building Physics, Services and Construction (IBPSC), headed by Univ.-Prof. Dr. Ing. Christina Hopfe, where we are also involved in the education of civil engineering students. Due to this strong academic collaboration, we are able to bring together resources and knowledge across many different fields, and disciplines, including: building physics, services and construction, to inform both policy and praxis.



LFB – TU Graz

## Institute of Electronic Music and Acoustics (IEM) of the University of Music and Performing Arts Graz

The Institute of Electronic Music and Acoustics (o.Univ.-Prof. Mag. DI Dr. Robert Höldrich, Univ.-Prof. DI Dr.techn. Alois Sontacchi, Ass.Prof. DI Dr.rer.nat. Franz Zotter) of the University of Music and Performing Arts Graz was founded in 1965 as a multidisciplinary research institution, to bridge the gap between the arts, and natural sciences, and engineering. IEM's gained reputation by exploring new technologies in spatial audio, real-time

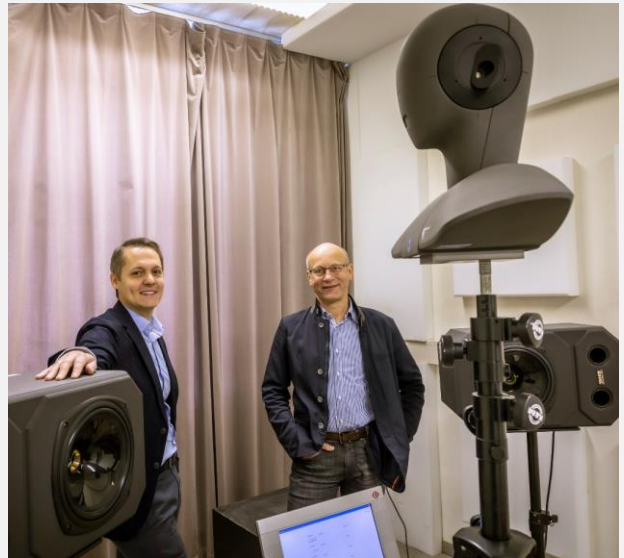
signal processing, and new means of artistic expression and live-interaction in contemporary electroacoustic music.

Research in acoustics could be outlined as:

- Virtual acoustics and spatial audio
- Audio and music signal processing
- Psychoacoustics
- Sonification and sonic interaction design

[www.iem.kug.ac.at](http://www.iem.kug.ac.at)

The institute (Univ. Prof. Dr.-Ing. Martin Fellendorf) is part of the faculty of civil engineering focusing on fundamental and applied research in travel demand and traffic flow modelling emphasizing numerical simulation and empirical data analysis. Environmental impact analysis of road transport is carried out at the institute including traffic induced air pollution, traffic noise and safety analysis. The institute maintains a psycho-acoustic laboratory including artificial heads for indoor and free field binaural recordings. Current key researcher psycho acoustics is DI Michael Cik.



ISV – TU Graz

**Institute of Mechanics (IFM)**[www.mechanik.tugraz.at](http://www.mechanik.tugraz.at)

The Institute of Mechanics (Univ.-Prof. Dr.-Ing. habil. Katrin Ellermann, Ao.Univ.-Prof. Dipl.-Ing. Dr.techn. Reinhard Braunstingl, Ass. Prof. Dipl.-Ing. Dr.techn. Michael Klanner) is dedicated to research topics related to dynamical systems. These include vibration analysis, rotor dynamics, mechatronic systems and flight simulation.

Efficient models need to represent an optimum between simplicity and accuracy. In order to find this optimum, experimental basic investigations with regard to special physical effects and also experimental investigations on the real system are required. The interaction of theory,

analytical and numerical techniques and experiment leads to a better understanding of the system and thus to efficient modelling.

- Numerical and analytical methods in structural dynamics
- Nonlinear and stochastic vibrations
- Experimental methods in rotor dynamics
- Experimental parameter estimation
- State estimation techniques and fault detection
- Surrogate modeling in mechanics and model order reduction
- Sensitivity analysis

**Institute of Applied Mechanics**[www.mech.tugraz.at](http://www.mech.tugraz.at)

The institute (Univ.-Prof. Dr.-Ing. Martin Schanz) is responsible for under-graduate education in mechanics for civil and electrical engineering. The research focuses on computational mechanics such as structural optimisation, isogeometric analysis, boundary element methods, and the modelling of porous media for different fields of application.

Acoustics is an important field of application of the developed numerical algorithms, e.g., the acoustics of porous materials or scattering of waves.

For experimental validation, cooperations exist with the laboratory of building physics of the faculty of civil engineering sciences.

# ACOUSTICS TEACHING AT TU GRAZ

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## Electrical Engineering and Audio Engineering

The study program Electrical Engineering and Audio Engineering at the TU Graz and the University of Music and Performing Arts Graz has an excellent international reputation, and an interdisciplinary approach characterizes it. The program is based on a profound scientific and music-theoretical education. Students can expand their knowledge by choosing from electrical engineering, acoustics, information technology, and audio technology, resulting in graduates with excellent interdisciplinary knowledge and skills. A unique collaboration in the German-speaking world makes it possible to experience the subject of acoustics in its full breadth. Alumnae of the study program work in various branches along the dividing line between

music and technology, contributing their interdisciplinary skills. The traditionally strict barriers between technology and music can be overcome - this can be seen quite clearly in this degree program.

## Infrastructure for Acoustic Research at the TU Graz

- Recording Studio
- Sound Lab
- Reverberation Chamber
- Numerous devices for acoustic Measurements
- Electroacoustics Lab

## Infrastructure for Acoustic Research at the University of Music and Performing Arts Graz

- Various Music Production Studios
- 3D Audio Playback Rooms



# APPLY NOW

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to the

Dean of the Faculty of Electrical and Information Engineering  
Univ.-Prof. DI Dr. Wolfgang Bösch, MBA  
Graz University of Technology  
Inffeldgasse 18/EG, 8010 Graz, Austria  
E-Mail: dekanat.etit@tugraz.at

**Application deadline: July 10, 2022**

Hearings are planned between September 26 and October 7, 2022

Contact for questions: Prof. G. Kubin und Prof. M. Kaltenbacher

Application form available at:

**<https://www.tugraz.at/go/professorships-vacancies>**

[www.etit.tugraz.at](http://www.etit.tugraz.at)