

The field of Diplomated (Dipl.) or Professional (Prof.) Sound Engineering encompasses the study of mechanical waves in general, particularly those within the audible range. This includes their generation, propagation, processing, reception, and recording, regardless of whether they are perceptible to the human ear or not. The career offers a comprehensive combination of theoretical knowledge and practical skills, emphasizing research and entrepreneurial abilities.

The Dipl./Prof. Sound Engineering program comprises three main branches:

Recording Sciences: This branch covers recording techniques and processing used in recording studios, mastering rooms, and live sound companies. Students gain knowledge about sound capture and manipulation, refining their skills in various aspects of the recording process.

Audio Electronics: In this area, students learn about the utilization, internal functioning, design, construction, and specification of electronic equipment used in sound engineering. They acquire a deep understanding of the electronic components and systems involved in recording, processing, and amplification of audio signals.

Acoustics and Electroacoustics: The contents of this area focus on the study, measurement, and recording of vibrations, noise, sound absorption, diffusion, transmission, and all phenomena involving sound fields. In addition, students explore instruments, regulations and standards, diagnostics, analysis, and acoustic treatments for different venues (concert halls, studios, industries, among others), as well as problem-solving techniques through simulations, scale models, measurements, and interpretation of results.

Through this multifaceted curriculum, aspiring Sound Engineers gain a solid foundation in the physical principles of sound and practical experience in measurements, recording, signal processing, audio electronics, acoustics, and electroacoustics. This prepares them to excel in various fields such as transducer design (microphones and speakers), metrology laboratories, noise and vibration mitigation, recording studios, live sound production, mastering studios, audio equipment design, acoustic consulting, health sciences, underwater acoustics, and many other specialized branches.

CAREER OPPORTUNITIES

Diplomated or Professional Sound Engineering encompasses various fields where students can apply their skills and knowledge. Some areas in which Sound Engineers can make a significant impact include:

Sound Production: This involves recording, processing, mixing, and re-amplifying sound. Sound Engineers acquire extensive knowledge of the principles and techniques involved in sound wave propagation and audio signals, including which equipment to use, how to create and specify them, and how to improve them. In the program, they acquire competencies in microphone techniques for different instruments and acoustic conditions, as well as methodologies for designing audio electronics and software for filters, noise reducers, compressors, limiters, artificial reverberators, and more. They apply this knowledge in various areas such as sound recording for music, film, streaming, television, broadcasting, sound and dialogue for video games, podcast production, and creating audio content for digital media.

They also contribute to companies that produce audio electronic equipment and software development (plug-ins).

Live Sound: This involves controlling sound during live performances. Dipl./Prof. Sound Engineers work closely with bands and artists, performing necessary signal mixing and processing. They perform speaker system tuning, interconnection design of audio systems, and acoustic measurements to optimize the performance of electroacoustic systems. They also acquire competencies to develop audio electronic equipment, such as preamplifiers and power amplifiers.

Medical Applications: Dipl./Prof. Sound Engineers play a crucial role in the development of electronics for medical purposes, especially in the fields of ultrasound, neurology, audiology, and electrocardiology. They acquire competencies in signal processing techniques for electroencephalography (EEG), hearing aids, and auditory evoked potentials (AEPs), contributing to advances in diagnostic tools and treatments for neurological and auditory disorders. Their expertise contributes to the design and calibration of devices such as EEG machines, ultrasound equipment, and software for data analysis in the medical field. They can also participate in the application of mechanical waves to understand how sound interacts with cells, tissues, organs, and organisms, collaborating with doctors and therapists (speech, hearing, cognition, traumatology, etc.) to advance medical diagnostic and therapeutic technologies.

Aerospace and Automotive Acoustics: The competencies of sound engineering extend to the aerospace industry, where engineers design, measure, and optimize acoustic systems for airplanes, spacecraft, and drones. Some of the contributions in this field focus on noise and vibration measurement and control, ensuring comfortable and safe acoustic environments for passengers, crew, and equipment. In the automotive sector, sound engineers contribute to improving the interior and exterior acoustics of vehicles and reducing tire noise, enhancing sound quality, reducing noise, and creating an immersive audio experience for drivers and passengers. They can also apply their acquired skills in vibration measurement and damping system optimization.

Railway Industry: In addition to participating in the design of insulation, damping systems, and materials for passenger comfort, sound engineers can apply their acquired competencies in vibration measurement on railway tracks to contribute to the rail and sleeper maintenance process.

Urban Noise: By applying their acquired competencies, graduates can work in consulting and advisory roles related to the measurement, prediction, identification of sound sources, and control of urban noise. This has direct applications in urban and regional planning, building placement, and the development of sound barriers near highways, airports, railways, and other transportation centers. They can be part of environmental quality teams, control organizations, and environmental departments.

Architectural Acoustics: Sound engineers acquire skills and experience in measuring and controlling vibrations and noise in buildings. They collaborate closely with architects and designers, offering their expertise to assist in the building design process, industrial buildings, and spaces with high degrees of noise pollution. By leveraging their knowledge of diffraction, refraction, absorption, interference, and the objective and subjective properties of sound fields, they contribute to the creation of acoustically optimized structures. This ensures that buildings offer superior acoustic performance, leading to greater comfort for occupants and a

reduction in noise disturbances. They also have knowledge to develop acoustic materials and coatings.

Metrology: Skills in areas such as electronics, signal processing, transducers, and metrology allow graduates to be part of companies dedicated to the development of instruments and software for noise and vibration measurement. They also have the abilities to be part of metrology laboratories where acoustic measurements of materials, transducers, surfaces, and machinery are carried out following national and/or international standards.

Underwater Acoustics: Prof./Dipl. sound engineers participate in the design and calibration of hydrophones used for the detection and analysis of underwater sound, as well as amplification stages and signal processing software. Their work contributes to fields such as marine biology, environmental monitoring, and sonar systems, among others.

Petroleum Prospecting and Fracking Evaluation: Graduates have the competencies to work in the fossil fuel extraction field. They can develop systems to study sound transmission in soils and pipelines, analyzing impacts, obstructions, and reflections in different soil layers.

Research: Dipl./Prof. Sound engineering offers great research possibilities in a wide range of areas. Researchers can explore novel techniques for audio signal processing, investigate acoustic materials and advanced treatments, develop simulation models to predict sound propagation and absorption, and study psychoacoustics to better understand human perception of sound, among many other topics of interest to society. Additionally, research can involve exploring new applications of sound engineering in fields such as virtual reality, augmented reality, autonomous vehicles, communication, human-computer interaction, medicine, biology, and more.

Professional/Diplomated Sound Engineering finds applications in every industry and sector where mechanical waves exist. Professionals contribute to the design and production of equipment, work with architects and builders in architectural acoustics to optimize acoustic environments, provide expertise in legal acoustics by advising lawyers and government entities on noise regulations and mitigation strategies. Moreover, their skills are valuable in the transportation industry, where they contribute to improving acoustic comfort in the interior of airplanes, trains, automobiles, and in the transportation sectors of oil, fuel, and fluids in general. Sound engineers also play a significant role in domains such as broadcasting, television, recording studios, mixing, mastering, sound and image post-production, and live sound production, shaping the auditory experiences of audiences in these media. They can also make significant contributions in areas such as medicine, aerospace, research, architectural design, underwater acoustics, and entertainment. The field offers infinite possibilities to enhance our understanding, utilization, and control wherever sound exists.