INTERNATIONAL AUDIO LABORATORIES ERLANGEN
A joint institution of Fraunhofer IIS and Universität Erlangen-Nürnberg

AUDIO LABS

Winter Term 2026/27

Selected Topics in Deep Learning for Audio, Speech, and Music Processing

Lecture

Overview

Stefan Balke, Andreas Brendel, Ben Maman, Meinard Müller

FAU Friedrich-Alexander-Universität Erlangen-Nürnberg

Fraunhofer IIS

Stefan Balke

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Andreas Brendel

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Ben Maman

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Meinard Müller

- Mathematics (Diplom/Master, 1997)
  Computer Science (PhD, 2001)
  Information Retrieval (Habilitation, 2007)
- Senior Researcher (2007-2012)
- Professor Semantic Audio Processing (since 2012)
- Former President of the International Society for Music Information Retrieval (MIR)
- IEEE Fellow for contributions to Music Signal Processing

universitätbonn

mpi max planck institut informatik

FAU

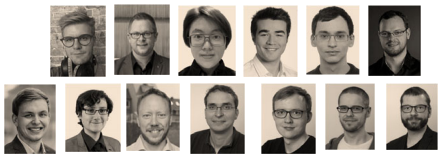
ISMIR

IEEE

Meinard Müller: Research Group

- Johannes Zeitler
- Sebastian Strahl
- Uli Berendes
- Abhirup Saha
- Manuel Peters
- Vlora Arifi-Müller
- Stefan Balke
- Ben Maman

- Simon Schwär
- Peter Meier
- Ching-Yu Chiu (Sunny)
- Yigitcan Özer
- Michael Krause
- Christof Weiß
- Sebastian Rosenzweig
- Frank Zalkow
- Hendrik Schreiber
- Christian Dittmar
- Stefan Balke
- Jonathan Driedger
- Thomas Prätzlich
- …



International Audio Laboratories Erlangen

- Fraunhofer Institute for Integrated Circuits IIS
- Largest Fraunhofer institute with > 1000 members
- Applied research for sensor, audio, and media technology

AUDIO LABS

- Friedrich-Alexander Universität Erlangen-Nürnberg (FAU)
- One of Germany's largest universities with ≈ 40,000 students
- Strong Technical Faculty

International Audio Laboratories Erlangen

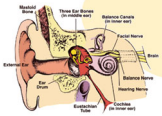
Audio

International Audio Laboratories Erlangen

Audio Coding

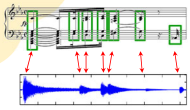
3D Audio

Audio



Psychoacoustics

Internet of Things



Music Processing

Lecture Course

Selected Topics in Deep Learning for Audio, Speech, and Music Processing

- 2,5 ECTS Module (EEI, CME, ICT, Computer Science, AI, ...)
- Place: Room 3R4.05 (AudioLabs Seminar Room)
- Time: Thursdays 16:00 – 18:00
- 10 Sessions: One lecture per session
- Content of lectures largely independent
- Written exam (1 hour)
- Sample exam questions available
- Resources: Course website, StudOn, Campo

Course Requirements — Advanced Master's Level

Deep Learning	Required
Digital Signal Processing	Required
Audio and Music Processing	Recommended
Statistical Signal Processing	Helpful

Course Structure and Content — Ten Lectures

- Introduction to Audio and Speech Processing
- Differentiable Alignment Techniques for Music Processing
- Nonnegative Decomposition of Music Audio
- Differentiable Digital Signal Processing (DDSP)
- Automatic Music Transcription
- Introduction to Generative Models for Audio Processing
- Diffusion and Flow Matching
- Diffusion-Based Music Synthesis
- Dataset Curation
- From Theory to Practice

Our Commitment and Your Contribution

What We Offer

- Engaging in-person lectures
- Open discussions and support
- Key techniques and applications
- Preparation for thesis or internship work

What We Expect

- Attend regularly and on time
- Participate actively and ask questions
- Review the material continuously
- Stay motivated and prepare thoroughly for the exam

This course is for you! We want you to learn and succeed!

References and Links

- Christopher Bishop: Deep Learning. Foundations and Concepts. Springer, 2024.
- …
- Meinard Müller: Fundamentals of Music Processing. Springer, 2021. https://audiolabs-erlangen.de/FMP
- Meinard Müller, Sebastian Strahl: PCP: A Preparation Course in Python. From Programming Fundamentals to the Fourier Transform. In Preparation. https://audiolabs-erlangen.de/PCP
- Meinard Müller, Sebastian Strahl: PCPT: A Preparation Course in PyTorch. Through the Principles of Signal Processing. FAU University Press, 2026. https://audiolabs-erlangen.de/PCPT
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