

Lecture
Music Processing
Course Overview

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International Audio Laboratories Erlangen
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Meinard Müller



- Mathematics (Diplom/Master, 1997)
Computer Science (PhD, 2001)
Information Retrieval (Habilitation, 2007)
Bonn University
- Combinatorics (Postdoc)
Keio University, Japan
- Senior Researcher (2007-2012)
Max-Planck Institute, Saarland
- Professor Semantic Audio Processing (since 2012)
Erlangen-Nürnberg University



Meinard Müller: Research Group



- Michael Krause
- Simon Schwär
- Yigitcan Özer
- Peter Meier (external)



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International Audio Laboratories Erlangen



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



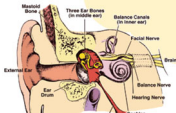

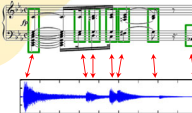


- Friedrich-Alexander Universität Erlangen-Nürnberg (FAU)
- One of Germany's largest universities with ≈ 40,000 students
- Strong Technical Faculty

International Audio Laboratories Erlangen



International Audio Laboratories Erlangen

Audio

AudioLabs – FAU

- Prof. Dr. Jürgen Herre
Audio Coding
- Prof. Dr. Bernd Edler
Audio Signal Analysis
- Prof. Dr. Meinard Müller
Semantic Audio Processing
- Prof. Dr. Emanuel Habets
Spatial Audio Signal Processing
- Prof. Dr. Nils Peters
Audio Signal Processing
- Dr. Stefan Turowski
Coordinator AudioLabs-FAU



Related Courses

Audio Processing Laboratory

The objective of this lab course is to give students a hands on experience in audio processing.

- Offered every semester
- Short-Time Fourier Transform
- Speech Enhancement
- Statistical Methods
- Speech Analysis
- ...

Registration via StudOn is mandatory!

Audio Processing Seminar

Various applications within audio and acoustic signal processing.

- Offered every semester
- Advanced topics
- Require lecture on DSP, audio, ...
- Also music-related topics
- ...

Registration via StudOn is mandatory!



Registration on studOn is mandatory!

Related Courses

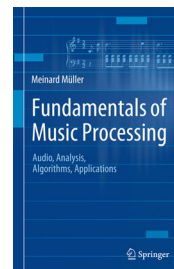
- **Speech Enhancement**
Prof. Dr. Emanuel Habets
AudioLabs
- **Advanced Topics in Perceptual Audio Coding**
Prof. Dr. Jürgen Herre
AudioLabs
- **Music Processing – Synthesis**
Dr. Maximilian Schäfer
Lehrstuhl für Digitale Übertragung (IDC)

Lecture: Music Processing Analysis (MPA)

https://www.audiolabs-erlangen.de/fau/professor/mueller/teaching/2022w_mpa

- Dates, Material, Information ... → [See website!](#)
- Time (Lecture): Mo 16-18
- Time (Exercise): Mo 14-16
- Mandatory elective for course for EEI, CME, ICT, ASC
Credits: 2,5 ECTS (Module MPA)
- Elective course for CME
Credits: 5 ECTS (Module MPA-LE)
- Course for Computer Science, AI, ...
Credits: 5 ECTS (Module MPA-LE)
- Oral exam for all study programs

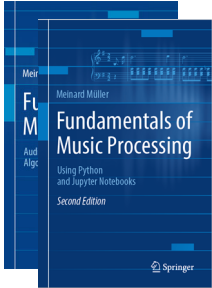
Textbook: Fundamentals of Music Processing (FMP)



Meinard Müller
Fundamentals of Music Processing
Audio, Analysis, Algorithms, Applications
Springer, 2015

Accompanying website:
www.music-processing.de

Textbook: Fundamentals of Music Processing (FMP)

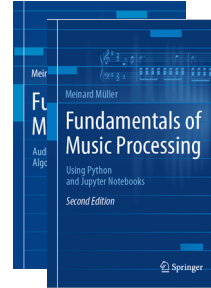


Meinard Müller
Fundamentals of Music Processing
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Springer, 2015

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www.music-processing.de

2nd edition
Meinard Müller
Fundamentals of Music Processing
Using Python and Jupyter Notebooks
Springer, 2021

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Textbook: Fundamentals of Music Processing (FMP)

Chapter	Music Processing Scenario
1	Music Representations
2	Fourier Analysis of Signals
3	Music Synchronization
4	Music Structure Analysis
5	Chord Recognition
6	Tempo and Beat Tracking
7	Content-Based Audio Retrieval
8	Musically Informed Audio Decomposition

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FMP Notebooks: Education & Research

FMP Notebooks
Python Notebooks for Fundamentals of Music Processing

The FMP notebooks offer a collection of educational material closely following the textbook *Fundamentals of Music Processing (FMP)*. This is the starting website, which is opened when calling <https://www.audiolabs-erlangen.de/FMP>. Besides giving an [overview](#), this website provides information on the license, the main contributors, and some links.

<https://www.audiolabs-erlangen.de/FMP>

Course Requirements

- Strong background in
 - Mathematics
 - Signal processing
 - Algorithms & data structures
 - Pattern recognition
- Python programming skills
- Strong interest in music
- Deep learning not required
- High motivation!!!

Our Offer

- Material
 - Textbook
 - FMP Notebooks
 - Website
 - Exam questions
- Lecture & Exercise
- Individualized supervision
- Playground for deep learning
- High motivation!!!

This specialized course is demanding!

References (FMP Notebooks)

- Meinard Müller: Fundamentals of Music Processing – Using Python and Jupyter Notebooks. 2nd Edition, Springer, 2021.
<https://www.springer.com/gp/book/9783030698072>
- Meinard Müller and Frank Zalkow: libfmp: A Python Package for Fundamentals of Music Processing. Journal of Open Source Software (JOSS), 6(63): 1–5, 2021.
<https://joss.theoj.org/papers/10.21105/joss.03326>
- Meinard Müller: An Educational Guide Through the FMP Notebooks for Teaching and Learning Fundamentals of Music Processing. Signals, 2(2): 245–285, 2021.
<https://www.mdpi.com/2624-6120/2/2/18>
- Meinard Müller and Frank Zalkow: FMP Notebooks: Educational Material for Teaching and Learning Fundamentals of Music Processing. Proc. International Society for Music Information Retrieval Conference (ISMIR): 573–580, 2019.
<https://zenodo.org/record/3527872#.YOhEQoqzaUk>
- Meinard Müller, Brian McFee, and Katherine Kinnaird: Interactive Learning of Signal Processing Through Music: Making Fourier Analysis Concrete for Students. IEEE Signal Processing Magazine, 38(3): 73–84, 2021.
<https://ieeexplore.ieee.org/document/9418542>

Resources (Group Meinard Müller)

- FMP Notebooks:

<https://www.audiolabs-erlangen.de/FMP>

- libfmp:

<https://github.com/meinardmueller/libfmp>

- synctoolbox:

<https://github.com/meinardmueller/synctoolbox>

- libtsm:

<https://github.com/meinardmueller/libtsm>

- Preparation Course Python (PCP) Notebooks:

<https://www.audiolabs-erlangen.de/resources/MIR/PCP/PCP.html>

<https://github.com/meinardmueller/PCP>