Architectural Acoustics

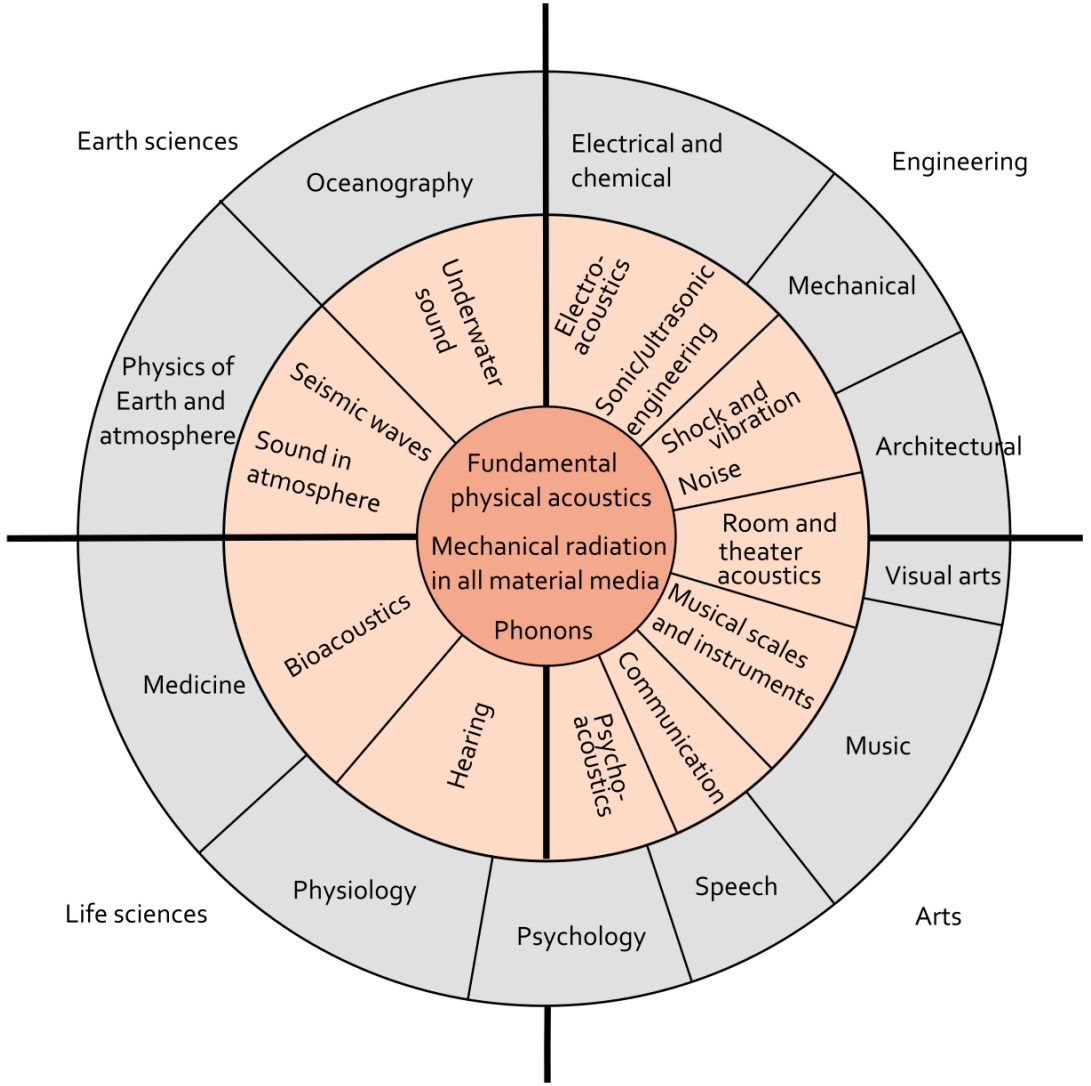
Introduction

"…the modern architect is designing for deaf. ~~His~~ Their ears are stuffed with bacon."

Raymond M. Schafer

Course topics

Architectural acoustics is a branch of acoustical science that deals with the design and modification of buildings and enclosed spaces to achieve optimal sound quality and control within those environments. It focuses on enhancing the acoustic properties of rooms, auditoriums, concert halls, theatres, offices, and various architectural structures to ensure that sound behaves in a desirable and functional manner.



Course topics

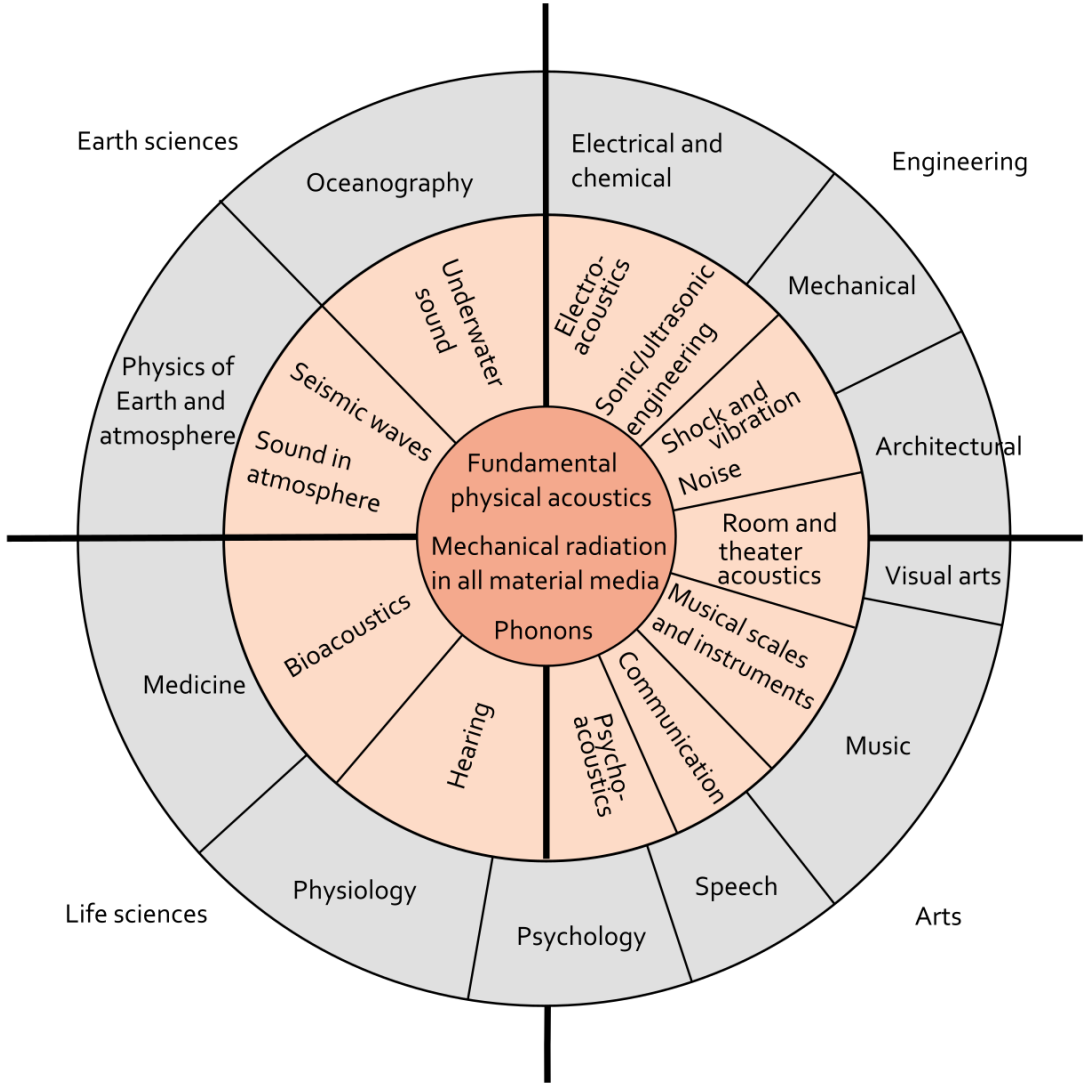
Sound insulation: Preventing unwanted sound from entering or escaping a space, ensuring privacy and reducing noise pollution.

Sound absorption: Managing the absorption of sound within a room to minimize echoes and reverberation, creating a comfortable listening environment.

Sound diffusion: Distributing sound energy evenly throughout a space to reduce acoustic hotspots and achieve a more balanced acoustic environment.

Sound reinforcement: Designing spaces to optimize the transmission and amplification of sound in settings like auditoriums, theatres, and concert halls.

Speech intelligibility: Ensuring that spoken words are clearly understood within a given space, which is crucial in educational, corporate, and public environments.

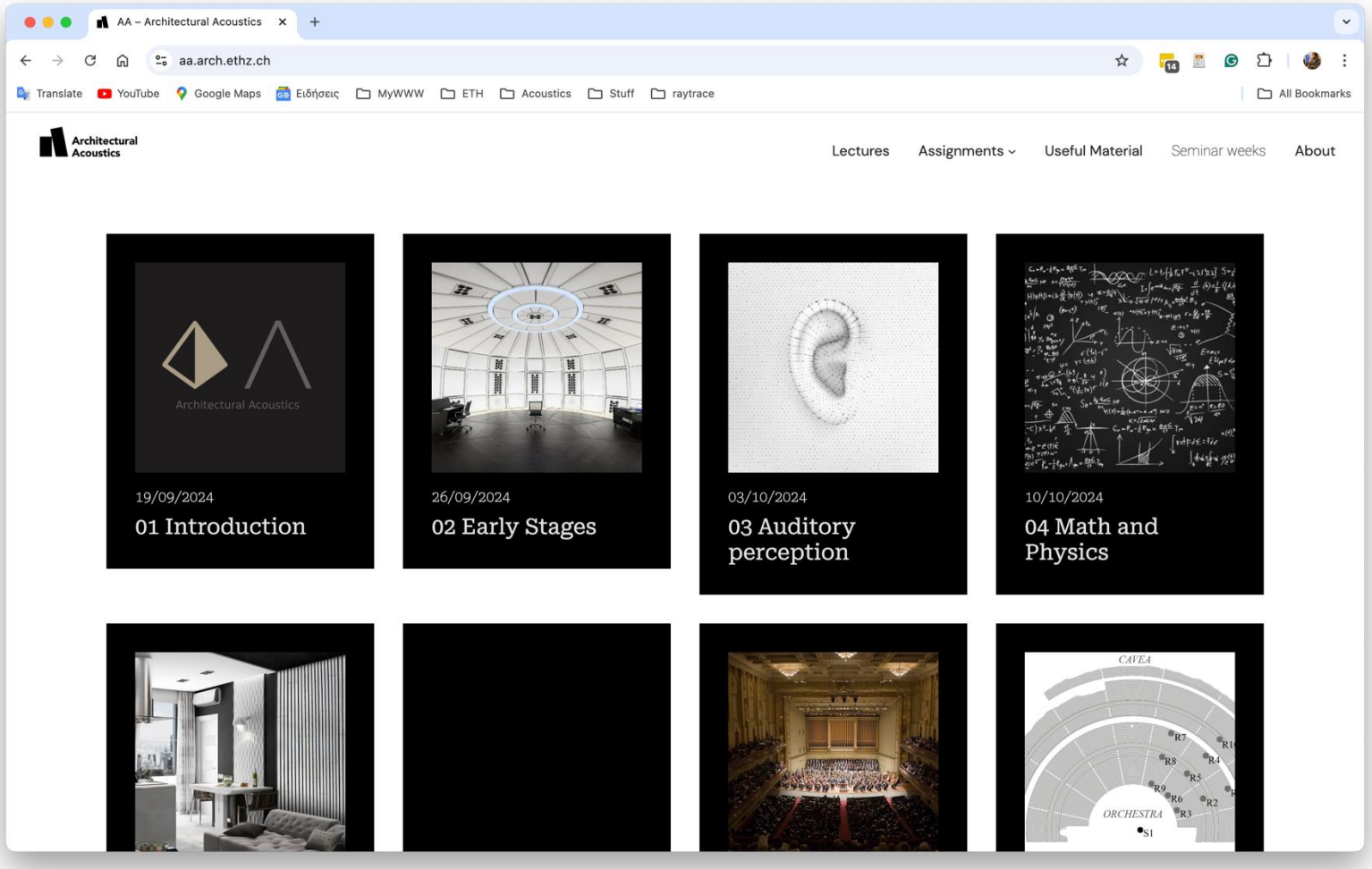


Format

Input lecture - Hands on exercises

~1h ~2h

Format



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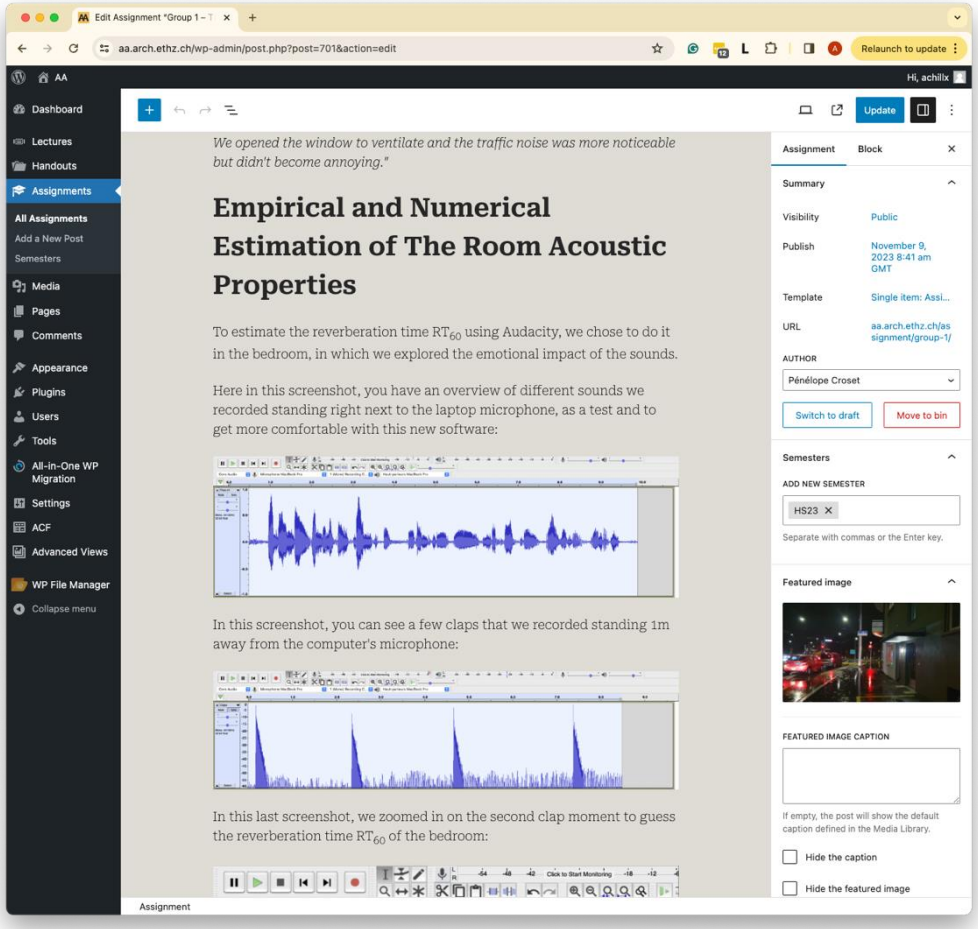
Format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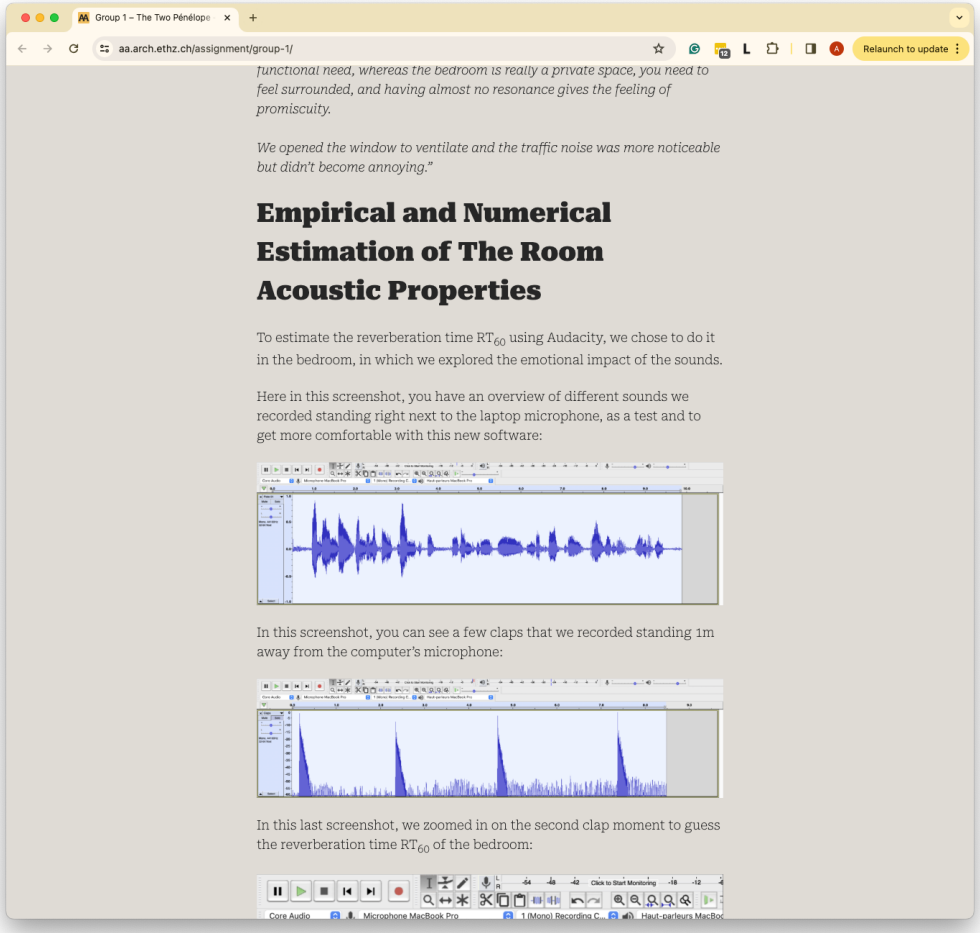
aa.arch.ethz.ch/wp-admin/post.php?post=701&action=edit
Relaunch to update
Hi, achillx
Dashboard
Lectures
Handouts
Assignments
All Assignments
Add a New Post
Semesters
Media
Pages
Comments
Appearance
Plugins
Users
Tools
All-in-One WP Migration
Settings
ACF
Advanced Views
WP File Manager
Collapse menu
Update
We opened the window to ventilate and the traffic noise was more noticeable but didn't become annoying."
Empirical and Numerical Estimation of The Room Acoustic Properties
To estimate the reverberation time RT60 using Audacity, we chose to do it in the bedroom, in which we explored the emotional impact of the sounds.
Here in this screenshot, you have an overview of different sounds we recorded standing right next to the laptop microphone, as a test and to get more comfortable with this new software:
In this screenshot, you can see a few claps that we recorded standing 1m away from the computer's microphone:
In this last screenshot, we zoomed in on the second clap moment to guess the reverberation time RT60 of the bedroom:
Assignment
Block
Summary
Visibility
Public
Publish
November 9, 2023 8:41 am GMT
Template
Single item: Assi...
URL
aa.arch.ethz.ch/assignment/group-1/
AUTHOR
Pénélope Croset
Switch to draft
Move to bin
Semesters
ADD NEW SEMESTER
HS23
Separate with commas or the Enter key.
Featured image
FEATURED IMAGE CAPTION
If empty, the post will show the default caption defined in the Media Library.
Hide the caption
Hide the featured image
Assignment


Group 1 – The Two Pénélope
aa.arch.ethz.ch/assignment/group-1/
Relaunch to update
functional need, whereas the bedroom is really a private space, you need to feel surrounded, and having almost no resonance gives the feeling of promiscuity.
We opened the window to ventilate and the traffic noise was more noticeable but didn't become annoying."
Empirical and Numerical Estimation of The Room Acoustic Properties
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Equipment

ZOOM
001:51:22
AUDIO
LO CUT
LIMITER
AUTOLEVEL
REC
OPTION
H1n
Handy Recorder

Assessment

Attendance

Assignments

Final project

Assessment

Attendance

8/10

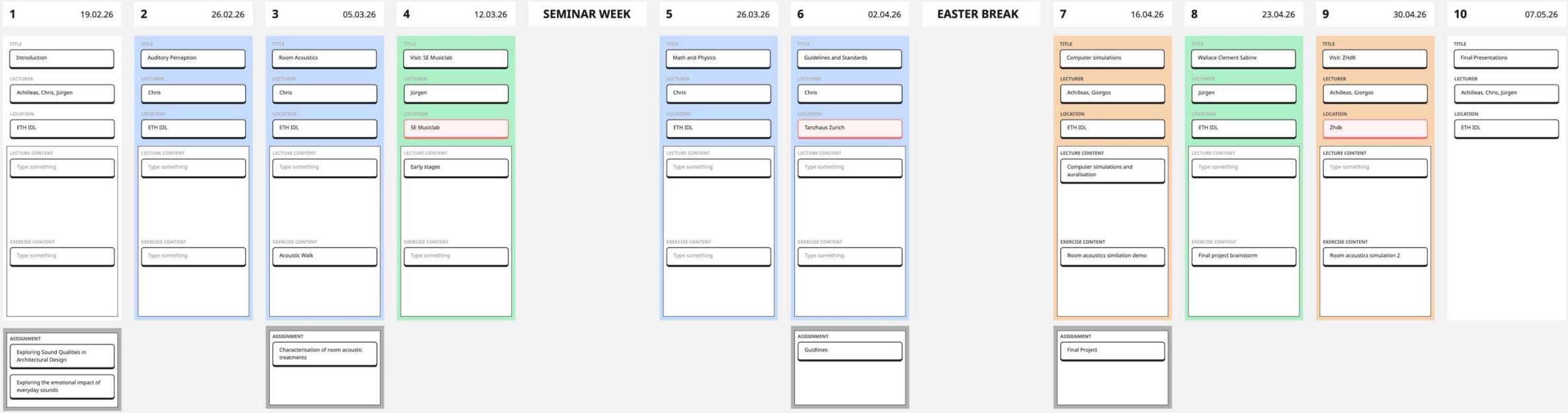
Assignments

3 every ~ 2 weeks | 50%

Final project

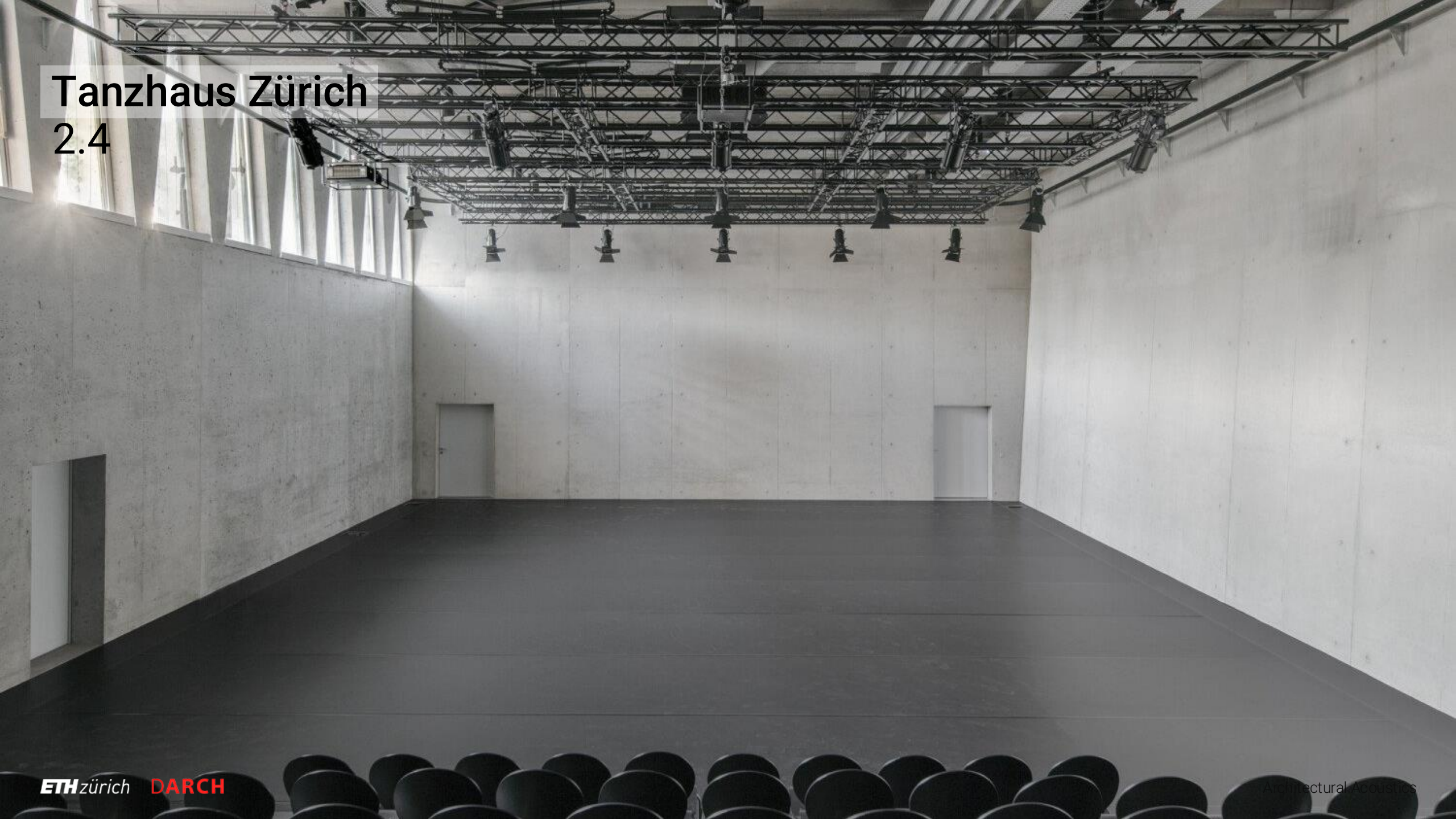
3 weeks | 50%

Schedule


1
19.02.26
TITLE
Introduction
LECTURER
Achilleas, Chris, Jürgen
LOCATION
ETH IDL
LECTURE CONTENT
Type something
EXERCISE CONTENT
Type something
ASSIGNMENT
Exploring Sound Qualities in Architectural Design
Exploring the emotional impact of everyday sounds
2
26.02.26
TITLE
Auditory Perception
LECTURER
Chris
LOCATION
ETH IDL
LECTURE CONTENT
Type something
EXERCISE CONTENT
Type something
3
05.03.26
TITLE
Room Acoustics
LECTURER
Chris
LOCATION
ETH IDL
LECTURE CONTENT
Type something
EXERCISE CONTENT
Acoustic Walk
ASSIGNMENT
Characterisation of room acoustic treatments
4
12.03.26
TITLE
Visit: SE Musiclab
LECTURER
Jürgen
LOCATION
SE Musiclab
LECTURE CONTENT
Early stages
EXERCISE CONTENT
Type something
SEMINAR WEEK
5
26.03.26
TITLE
Math and Physics
LECTURER
Chris
LOCATION
ETH IDL
LECTURE CONTENT
Type something
EXERCISE CONTENT
Type something
6
02.04.26
TITLE
Guidelines and Standards
LECTURER
Chris
LOCATION
Tanzhaus Zurich
LECTURE CONTENT
Type something
EXERCISE CONTENT
Type something
ASSIGNMENT
Guidlines
EASTER BREAK
7
16.04.26
TITLE
Computer simulations
LECTURER
Achilleas, Giorgos
LOCATION
ETH IDL
LECTURE CONTENT
Computer simulations and auralisation
EXERCISE CONTENT
Room acoustics similation demo
ASSIGNMENT
Final Project
8
23.04.26
TITLE
Wallace Clement Sabine
LECTURER
Jürgen
LOCATION
ETH IDL
LECTURE CONTENT
Type something
EXERCISE CONTENT
Final project brainstorm
9
30.04.26
TITLE
Visit: ZHdK
LECTURER
Achilleas, Giorgos
LOCATION
Zhdk
LECTURE CONTENT
Type something
EXERCISE CONTENT
Room acoustics simulation 2
10
07.05.26
TITLE
Final Presentations
LECTURER
Achilleas, Chris, Jürgen
LOCATION
ETH IDL

SE Musiclab
12.03

Tanzhaus Zürich
2.4



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