



PODCAST AND VIDEO FOR SCIENCE COMMUNICATION

Audio Recording and Basic Editing

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IR0000032 – ITINERIS, Italian Integrated Environmental Research Infrastructures System
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Mission 4 “Education and Research” - Component 2: “From research to business” - Investment
3.1: “Fund for the realisation of an integrated system of research and innovation infrastructures”



Audio Recording and Basic Editing

1. Basic Recording Techniques:

- Equipment Setup, Recording Environment e Introduction to RecordingSoftware.

2. Introduction to Audio Editing:

- Audio Cleaning, Essential Cuts, and Basic Mixing
- Practical Editing of a teaser

Lesson Goals

- Basic Knowledge of Required Audio Equipment
- Podcast Recording
- Podcast Post-production
- You will record your teasers and/or pilot episodes
- You will gain the skills to create a final audio edit from recordings.

Basic Recording Techniques

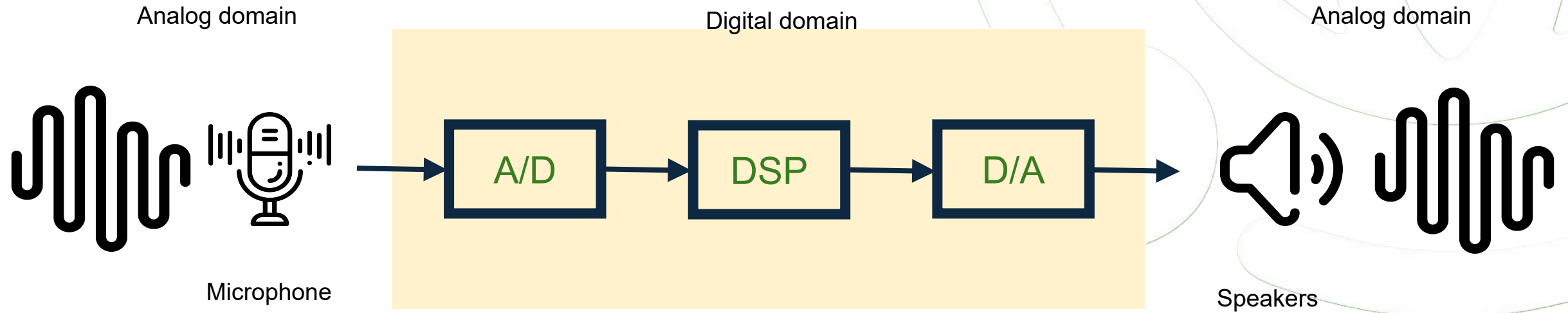
- Introduction
 - How Digital Audio Works
 - The Recording Chain
 - Introduction to audio equipment.
- Equipment Setup: mixer, microphones etc.
- Recording Environment
- Introduction to recording software

How Digital Audio Works

- What's "sound"?



The audio chain



The Recording Device: The Microphone

Definition: A device that transforms sound waves into electrical signals.

Types:

- **Dynamic**: Robust, for live events.
- **Condenser**: Sensitive, for recording studios.
- **Lavalier**: Small, for interviews.
- **Shotgun**: Directional, for film and TV.

Components:

- **Capsule**: Converts sound into electrical signals.
- **Diaphragm**: Vibrates in response to sound.
- **Transducer**: Converts vibrations into electrical signals.

Usage: Recording, amplification, communication.



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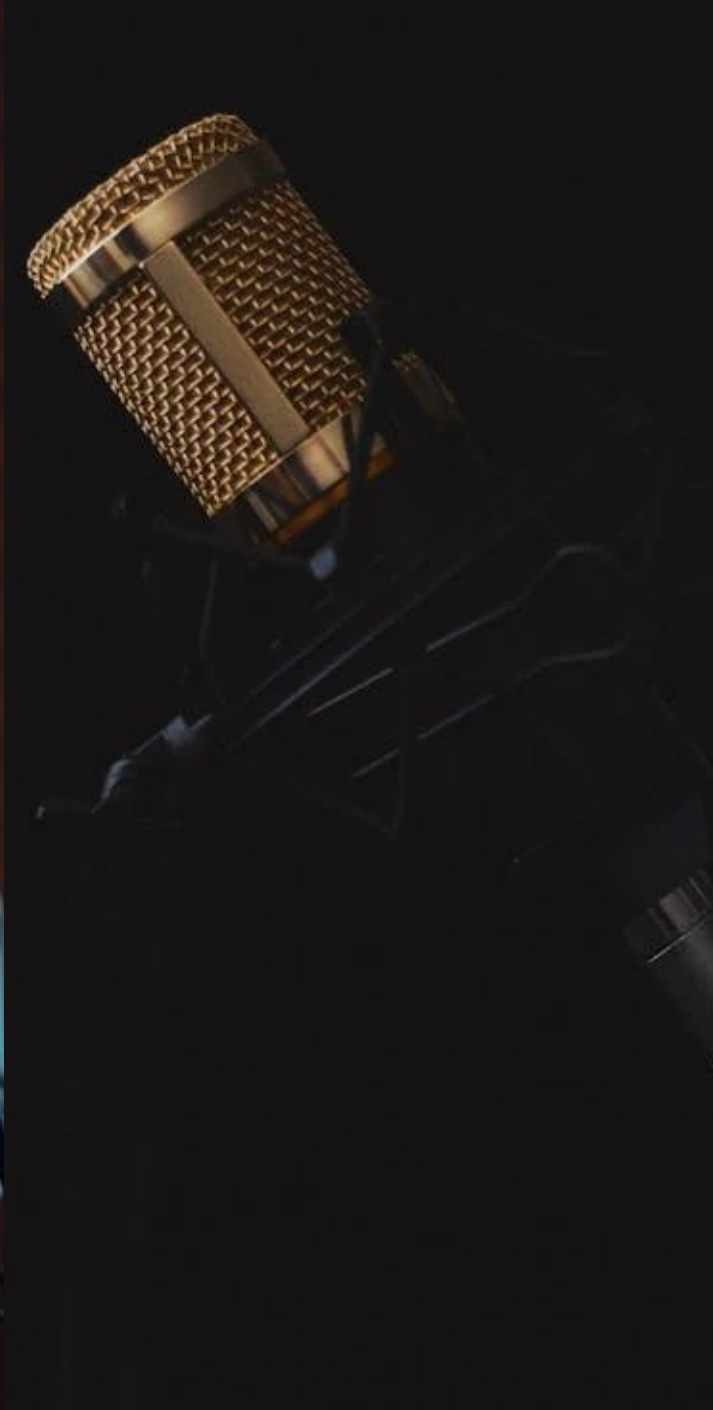
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XLR CONNECTOR

Il dispositivo di acquisizione

Definition: Device that acquires electrical signals and manipulates them.

Types:

- Mixer
- Audio interface
- Hybrids system



Basic Recording Techniques

- Introduction
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 - Introduction to audio equipment.
- **Equipment Setup: mixer, microphones etc.**
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- Introduction to recording software

Equipment Setup

1. Gather Your Equipment

- Microphone
- **XLR cable** (standard 3-pin)
- **Audio interface** (such as the **RODE AI-1** or **RODECaster Pro II**)
- **Headphones or speakers** for monitoring
- **Computer** with a Digital Audio Workstation (DAW) like **Pro Tools, Cubase, Ableton, Logic, GarageBand, or Reaper**

2. Connect the Microphone

- Plug one end of the **XLR cable** into the **RODE Procaster** microphone.
- Connect the other end of the **XLR cable** to the **audio interface** or **RODECaster Pro II**.

3. Set Up the Audio Interface

- If using an **audio interface**, connect it to your **computer** via **USB**.
- Ensure the interface is recognized by your **DAW**.

- Adjust **gain settings** to optimize audio levels (**REMEMBER: peaks must not go over 0dBfs, usually keep them around -6dBfs**).

4. Configure the Mixer

- Assign input channels for the **microphone** and other connected devices.
- Adjust **fader levels** to balance audio sources.
- Apply **processing effects** like **compression, EQ, and noise gate** if needed.

5. Monitor and Test

- Plug in **headphones or speakers** to monitor the audio output.
- Perform a **test recording** to check levels and clarity.
- Make necessary adjustments to **gain, EQ, and effects**.

6. Start Recording or Streaming

- Open your **DAW** and select the **RODE Mixer** as the input source.
- Begin recording or streaming with optimized settings.

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Recording Environment

- Check if the room has a lot of **reverberation**. Try to record in rooms with little reverberation, not too big and with absorbent material around the room (for example curtains, beds, carpets).
- Record in a place with little **background noise** or **external disturbances**
- Record in a **comfortable** place. *Recording sessions can be very stressful!* If you have guests or a video podcast, the visual component of the place you choose to record your podcast is also important.

Recording Software

Audacity: <https://www.audacityteam.org/>

Reaper: <https://www.reaper.fm/>

Adobe Audition: <https://www.adobe.com/it/products/audition.html>

Pro Tools: <https://www.avid.com/pro-tools>



Setting Up Audacity for Windows

Download & Install Audacity

- Get the latest version from the official Audacity website.

Configure Audio Settings

- Open **Audacity** and go to **Edit > Preferences > Devices**.
- Under **Recording**, select your **audio interface** as the input device.
- Set the **sample rate** to **44100 Hz or 48000 Hz** for optimal quality.

Install Audio Drivers

- Ensure your **audio interface drivers** are

installed from the manufacturer's website.

- If using **ASIO drivers**, Audacity does not support ASIO natively due to licensing restrictions.

Test & Record

- Click the **microphone icon** in Audacity and adjust the **input level**.
- Press **Record** and test your setup.

Setting Up Audacity for Mac

Download & Install Audacity

- Get the latest version from the official Audacity website.

Configure Audio Settings

- Open **Audacity** and go to **Audacity > Preferences > Devices**.
- Select your **audio interface** as the input device.
- Set the **sample rate** to **44100 Hz or 48000 Hz**.

Install Audio Drivers

- Mac users typically don't need additional drivers, but ensure your **audio interface** is

compatible with **Core Audio**.

- If using an older Mac, check for **driver updates** from the manufacturer.

Test & Record

- Adjust **input levels** in Audacity.
- Press **Record** and test your setup.

Audacity Tools Overview

Audacity offers several tools to help with **editing and manipulating audio**:

Selection Tool (F1)

Windows & Mac Shortcut: F1

Used to **select** portions of audio for editing.

Envelope Tool (F2)

Windows & Mac Shortcut: F2

Adjusts **volume levels** smoothly over time.

Draw Tool (F3)

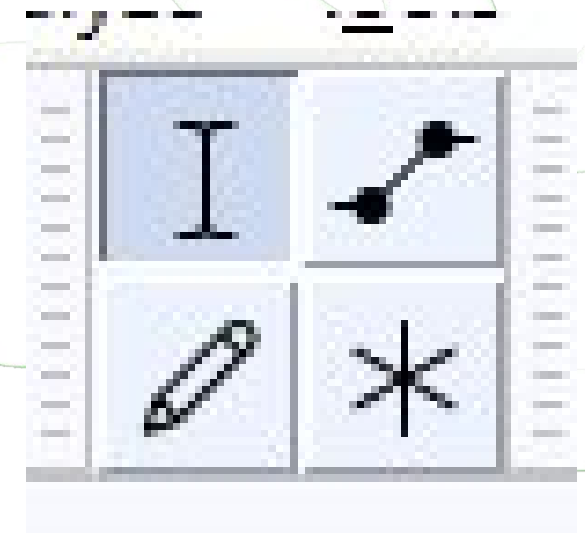
Windows & Mac Shortcut: F3

Allows **manual waveform editing** at a sample level.

Multi-Tool Mode (F6)

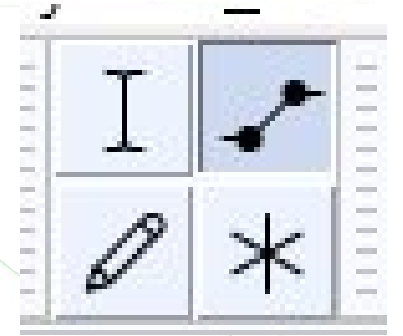
Windows & Mac Shortcut: F6

Combines all tools into one, switching based on cursor position.



Envelope Tool (F2) – Adjusting Volume Dynamically

The **Envelope Tool** allows you to **adjust volume levels smoothly** across a track.



How to Use the Envelope Tool

- **Activate the tool:** Press F2 (**Windows & Mac**) or click the **Envelope Tool** in the toolbar.
- **Click on the waveform:** Create **control points** where you want volume adjustments.
- **Drag the control points:**
 - **Up** increases volume.
 - **Down** decreases volume.
- **Fine-tune** by adding multiple points for gradual changes.

Use the **Undo function** (Ctrl + Z / Cmd + Z) if adjustments aren't right!

Setting Up the Sound Card

To ensure optimal recording and playback, configure your sound card correctly:.

Windows Setup

- Open Audacity and go to Edit > Preferences > Devices.
- Under Playback, select your sound card.
- Under Recording, select your microphone or audio interface.
- Set Channels to Mono (1) or Stereo (2).
- Adjust the sample rate to 44100 Hz or 48000 Hz for high-quality audio.

Mac Setup

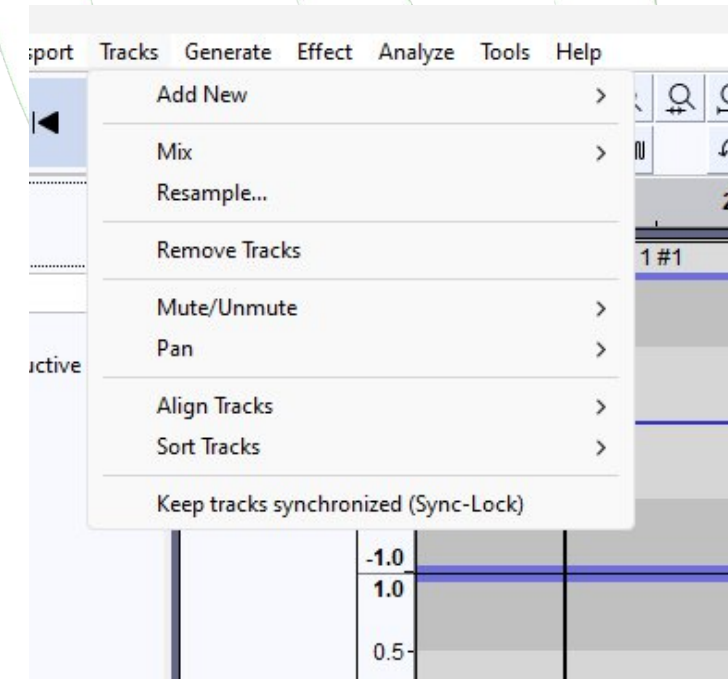
- Open Audacity and go to Audacity > Preferences > Devices.
- Select Core Audio as the host.
- Choose your input and output devices.
- Set sample rate to 44100 Hz or 48000 Hz.
- Ensure your audio interface is recognized.

Creating a Track

Audacity lets you create multiple tracks for layered audio recordings.

Steps to Create a Track

- Go to **Tracks > Add New**.
- Select either:
 - **Mono Track** (Single audio channel).
 - **Stereo Track** (Dual audio channels).
- Click on the new track to begin editing.



Shortcut: Ctrl + Shift + N (**Windows**) / Cmd + Shift + N (**Mac**) to create a **new track quickly**.

Recording Audio

Recording in Audacity is straightforward with a microphone or other audio sources.

Steps to Record

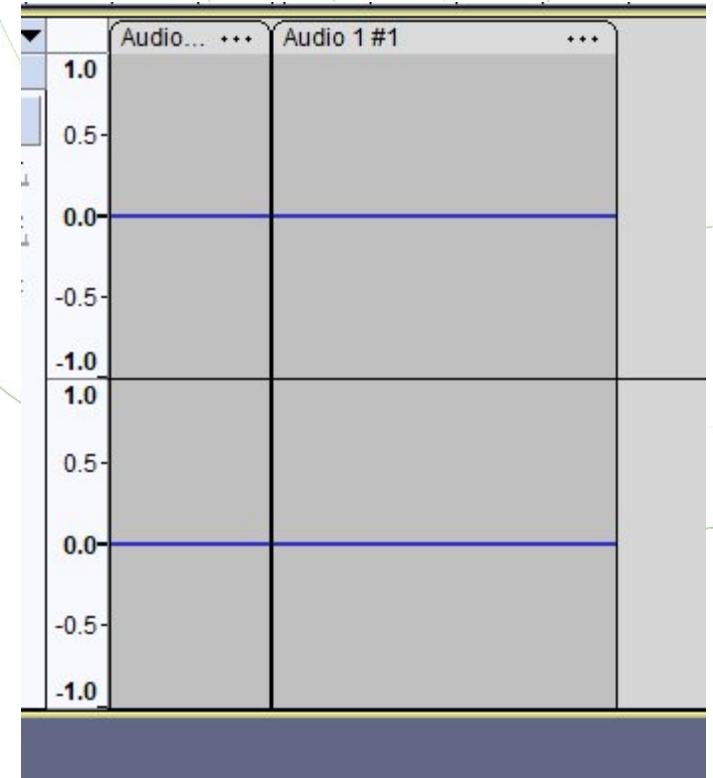
- 1. Set the microphone:**
- 2. Go to Edit > Preferences > Devices.**
- 3. Select the input device** (e.g., microphone or interface).
- 4. Adjust levels:** Use the **input level slider** to avoid clipping.
- 5. Start recording:** Press **R** (**Windows & Mac**) or click the **Record button**.
- 6. Stop recording:** Press **Spacebar** or click the **Stop button**.

Shortcut: Shift + R allows **append recording**, continuing from where you left off.

Cutting & Manipulating Clips

Audacity allows **precise editing** of audio clips:

- **Cutting Audio**
 - **Select the portion** of audio using the **Selection Tool (F1)**.
 - Press **Ctrl + X (Windows)** or **Cmd + X (Mac)** to **cut**.
 - Use **Ctrl + V (Windows)** or **Cmd + V (Mac)** to **paste**.
- **Splitting Clips**
 - Place the cursor where you want to **split**.
 - Go to **Edit > Clip Boundaries > Split**.
 - Shortcut: **Ctrl + I (Windows)** or **Cmd + I (Mac)**.
- **Moving Clips**
 - Use the **Time Shift Tool (F5)**.
 - Click and **drag** the clip to reposition it.



Audacity offers **real-time and destructive effects**:

- **Destructive Effects:** Permanently alter the waveform.
 - Examples: **Amplify, Normalize, Equalization.**
 - Once applied, **cannot be undone** after saving.
- **Non-Destructive Effects**
 - **Do not modify** the waveform.
 - Examples: **Reverb, Delay, Compression** (**applied in real-time**).
 - Can be **enabled/disabled** without affecting the original audio.

Destructive Editing

Applying Destructive Effects

- Select the **audio clip**.
- Go to **Effect > Choose Effect**
- Adjust settings and apply.

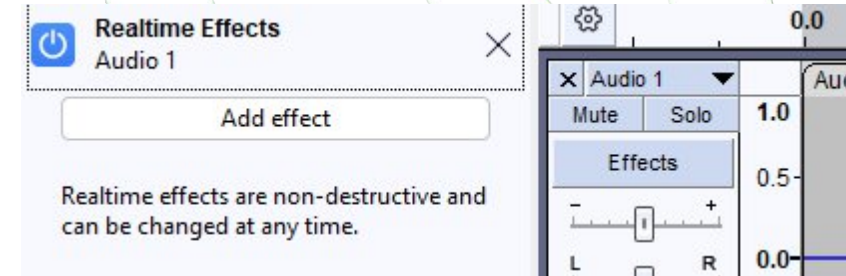
Undoing Effects

- Use Ctrl + Z (**Windows**) or Cmd + Z (**Mac**) to **undo**.
- Destructive Effects **permanently** alter the waveform. You cannot revert after you do some other modifications, you have to undo till the point you applied the effect.

Non-Destructive Editing

Applying Non-Destructive Effects (realtime)

- Select the **audio clip**.
- Go to **Effects** and **Add Effect**
- Adjust settings in realtime.



Undoing Effects

- Use Ctrl + Z (**Windows**) or Cmd + Z (**Mac**) to **undo**.
- Non-destructive effects can be **disabled** in the effects panel.

BREAK (15'')

Introduction to Audio Editing

- Audio Editing in Audacity: Cut, Move and Manipulate Audio.
- Clean our sound
- Add backing tracks and effects

Introduction mixing audio

Adding Effects in Audacity

- Essential Effects:
 - Equalizer
 - Compressor
 - Gate
 - De-esser
- Mixing Background Music and Voice
- Export an Audio File

Adding Third-Party Effects (VST, AU, or LADSPA Plugins)

Audacity supports **VST, AU, and LADSPA** plugins to enhance audio processing.

Installing Third-Party Effects

Windows Users

- **Download VST effects** from trusted sources.
- Move the **VST plugin (.dll file)** to: C:\Program Files\Audacity\Plug-Ins
- Open Audacity and go to **Effect > Add / Remove Plugins**.
- Find the new plugin and click **Enable**.

Mac Users

- **Download AU/VST plugins.**
- Move the **plugin file** to: /Library/Audio/Plug-Ins/Components
- Restart Audacity.
- Activate in **Effect > Add / Remove Plugins**.

Shortcut for Effects:

Ctrl + Shift + E (**Windows**) / Cmd + Shift + E (**Mac**) opens the **Effects menu**.

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[PLUGINS 4 FREE - Free Instrument Audio Plugins Archive](#)

Applying effects

Enhancing audio with **effects** can dramatically improve clarity, depth, and overall sound quality.

1. Equalization (EQ)

Adjusts specific **frequency ranges** to make sound **warmer, brighter, or clearer**.

Useful for **fixing muffled audio** or boosting bass/treble.

2. Compression

Balances volume by reducing loud peaks and boosting quieter parts.

Ideal for **voice recordings**, podcasts, and music mastering.

3. Reverb

Simulates **echo and space**, making audio sound **natural or atmospheric**.

Great for **vocals, instruments, or cinematic sound effects**.

4. Noise Reduction

Removes **background noise** like hums, hisses, or fan sounds.

Helps **clean up recordings** for professional quality.

Using a Third-Party Free Equalizer

Installing Frequalizer in Audacity

Windows Installation

- **Download the VST plugin** from the official site: [Frequalizer Plugin](#).
- Move the .vst file to: C:\Program Files\Audacity\Plug-Ins
- Open Audacity and navigate to **Effect > Add / Remove Plugins**.
- Locate **Frequalizer** and click **Enable**.
- Restart Audacity to ensure proper integration.

Mac Installation

- **Download the AU or VST plugin** from the official site.
- Move the .component file to: /Library/Audio/Plug-Ins/Components
- Open Audacity and go to **Effect > Add / Remove Plugins**.
- Find **Frequalizer** and click **Enable**.
- Restart Audacity to load the plugin.



Using a Third-Party Free Equalizer

Using Freqqualizer in Audacity

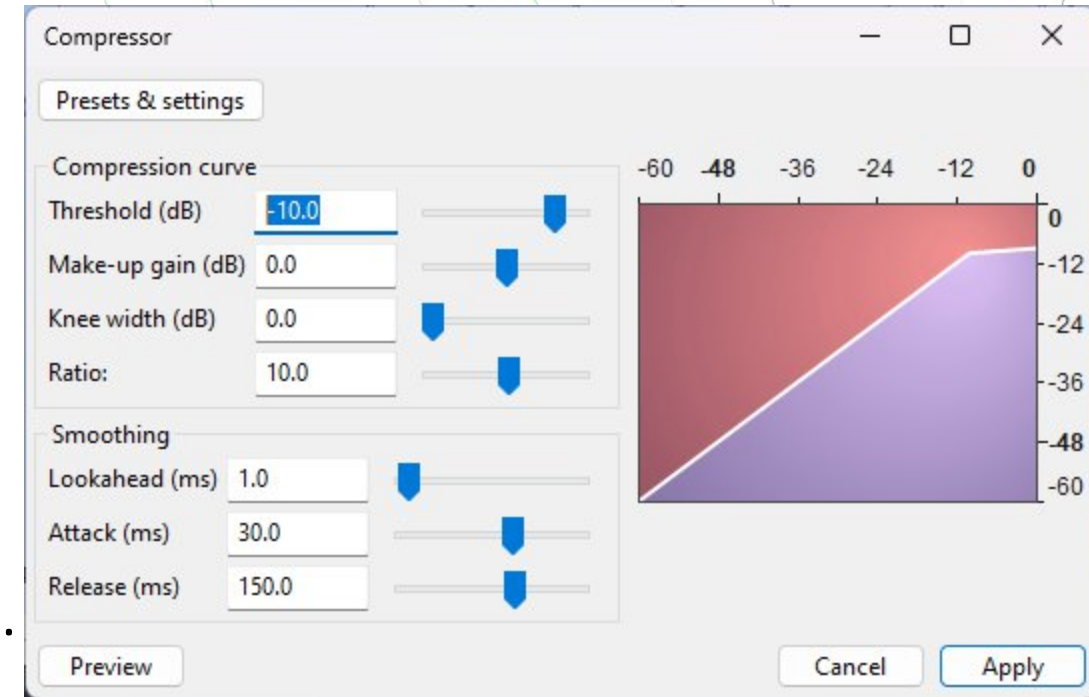
- **Select your audio track.**
- Go to **Effect > Freqqualizer**.
- Adjust the following parameters:
 - **6 frequency bands** (peak, notch, shelving, high pass, low pass).
 - **Analyzer mode** to visualize the before-and-after frequency response.
 - **Solo mode** to isolate specific frequency bands.
- Choose a control point and add gain; sweep from left to right to search unwanted resonances

Using the Built-in Compressor

Audacity's **Compressor** reduces the **dynamic range**, making quiet sounds louder and loud sounds softer.

How to Apply the Compressor

- **Select your audio track.**
- Go to **Effects > Add Effects > Audacity > Compressor.**
- Adjust the settings:
 - **Threshold:** Determines when compression starts.
 - **Ratio:** Controls how much compression is applied.
 - **Make-up Gain:** Restores lost volume.
 - **Knee Width:** Softens the compression curve.

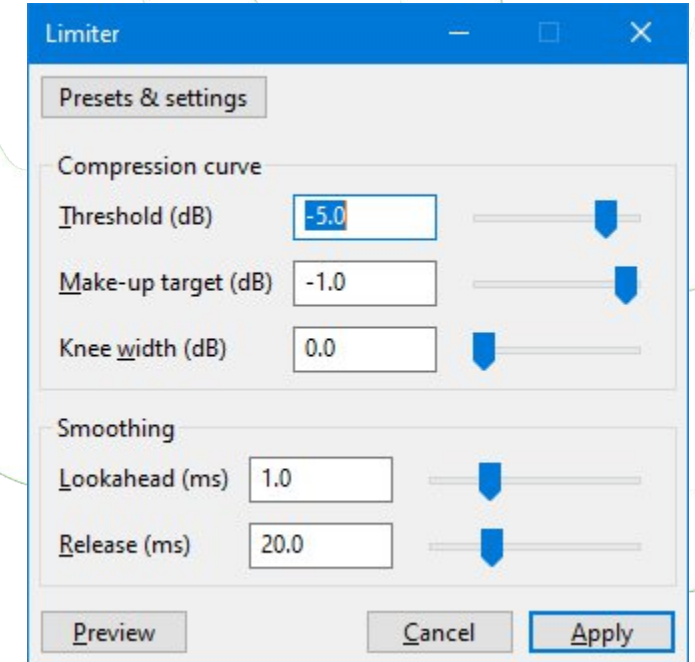


Using the Built-in Limiter

The **Limiter** prevents peaks from exceeding a set level, making audio **louder without distortion**.

How to Apply the Limiter

- **Select your audio track.**
- Go to **Effects > Add effect > Audacity > Limiter**.
- Adjust the settings:
 - **Threshold:** Sets the maximum level.
 - **Make-up Target:** Defines the loudest allowed output.
 - **Knee Width:** Softens the limiting effect.
 - **Lookahead:** Helps smooth transitions.
- Use this effect on the **master track** to prevent the sum of the tracks from exceeding 0 dBfs.

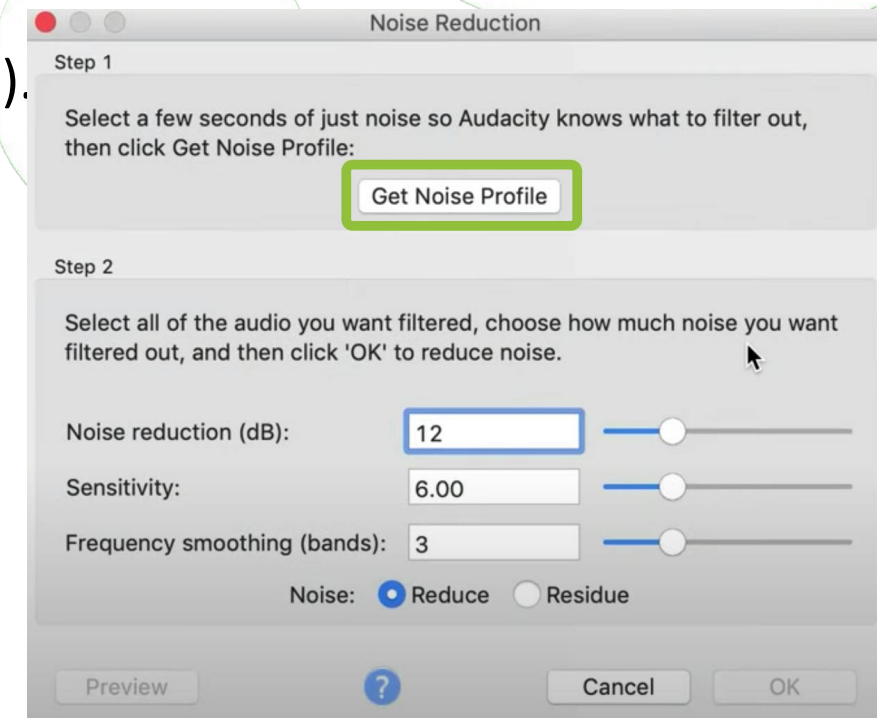


Using the Noise Reduction Effect

Audacity's **Noise Reduction** removes **background noise** like hums, hisses, and static.

How to Apply Noise Reduction

- Find a section of your track with only background noise.
- Go to **Effect > Noise Removal and Repair > Noise Reduction**.
- Click **Get Noise Profile** (this teaches Audacity what to remove).
- Select the entire track.
- Go back to **Noise Reduction** and adjust:
 - **Noise Reduction (dB)**: Controls how much noise is removed.
 - **Sensitivity**: Adjusts how aggressively noise is filtered.
 - **Frequency Smoothing**: Helps maintain natural sound.
- Click **OK** to apply.



Using a Third-Party Free Gate

Installing GGate in Audacity

[Download Free Noise gate plugin: GGate by GVST](#)

Windows Installation

- **Download GGate** from the official site: GGate Plugin.
- Move the .dll file to: C:\Program Files\Audacity\Plug-Ins
- Open Audacity and navigate to **Effect > Add / Remove Plugins**.
- Locate **GGate** and click **Enable**.
- Restart Audacity to ensure proper integration.

Mac Installation

- **Download the Mac VST version** from the official site.
- Move the .vst file to: /Library/Audio/Plug-Ins/Components
- Open Audacity and go to **Effect > Add / Remove Plugins**.
- Find **GGate** and click **Enable**.
- Restart Audacity to load the plugin.

Using a Third-Party Free Gate

Using GGate in Audacity

- Select your audio track.
- Go to **Effects > Add Effects > GVST > GGate**.
- Adjust the following parameters:
 - **Threshold:** Determines when the gate opens/closes.
 - **Fade:** Controls how smoothly the gate transitions.
 - **Attack:** Adjusts how quickly the gate responds to incoming audio.



Use **GGate** to clean up recordings with **background hums, amp noise, or unwanted static**.

Export an audio file

1. Prepare Your Audio for Export

- Make sure the **track is fully edited**.
- If using multiple tracks, **mix them down** using **File > Mix and Render**.
- Ensure the **audio levels** are optimized to avoid distortion.

2. Select Export Format

- **Go to** File > Export.
- Choose a format:
 - **WAV** (High quality, uncompressed)
 - **MP3** (Compressed, smaller file size)
 - **FLAC** (Lossless, high-quality compression)
 - **OGG** (Alternative compressed format)
 - **AIFF** (Similar to WAV, commonly used on Mac)

3. Adjust Export Settings

- Select **bit rate and sample rate** (recommended: 44100 Hz / 16-bit for general use).
- If exporting **MP3**, set the **bit rate** (128 kbps for standard, 320 kbps for high-quality audio).

4. Save & Export

- Choose a **destination folder**.
- Click **Save** and let Audacity export the file.

Shortcuts for Quick Export:

Windows: Ctrl + Shift + E

Mac: Cmd + Shift + E

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Editing your teaser

Lunch break



THANKS!

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