

SCUOLA DI MUSICA DI FIESOLE

FONDAZIONE – ONLUS

iscritta al n° 6 del Registro Regionale delle Persone Giuridiche Private

Agg.: 15/10/2019

Course Programme for TRIENNIO ORDINAMENTALE

ARTISTIC-DISCIPLINARY SECTOR CODE **COME/03** – ACOUSTIC MUSIC

Field of study : Acoustic Music

YEAR 1

| Hours | Credits | Mode of Verification | |
|-------|---------|----------------------|------|
| 30 | 4 | | EXAM |

PROGRAMME OF STUDY:

PART I – SOUND AND ITS INTERACTIONS WITH MATTER

References to mathematics and physics, introduction to sound and its properties

Properties of sound and of sound waves

- Wave characteristics, resonance, doppler effect and beats
- Frequency, amplitude, length of the wave, phase
- Speed of sound
- Distinctive characteristics of sound: height, intensity and timbre

Harmonic analysis of sound

- Simple and complex waves (harmonic, partial, octaves)
- The sound spectrum
- Waveform characteristics
- The dB, elementary operations with the decibel
- Physical magnitudes and unit of measurement

Sound as an auditory phenomenon: fundamental concepts

- The ear (anatomy of the aural organ) and auditory perception
- The levels of sound sensation
- Fletcher and Munson's isophonic curve
- Locating a sound source

Sound propagation in an open field

- Effects of disturbance on the propagation of sounds
- Dispersion and directionality of a sound source

PART II – Acoustics of confined environments

The phenomenon of sound

- Generation of sound
- Propagation of sound in a closed environment
- Sound levels in a closed space

Properties of the materials: Absorption, reflection and diffraction

Acoustic absorption due to porousness



SCUOLA DI MUSICA DI FIESOLE

FONDAZIONE – ONLUS

iscritta al n° 6 del Registro Regionale delle Persone Giuridiche Private

Acoustic absorption for resonance

- Absorption for membrane resonance
- Absorption for cavity resonance

Acoustic diffusers

Room acoustics

- Acoustics of confined spaces
- The first theatres - brief history up to the

contemporary

Sound in a closed environment

- Direct sound
- First reflections (temporal fusion)
- Reverberation
- Different environments
- Effects on the perception of sound
- Use of reverb in audio production
- Optimal reverberation time

Reverberation time and other acoustic parameters

- Sabine
- RT60
- Other ways to stimulate reverberation

Stationary waves

- Definition

Modal analysis of a room and dimensional relationships

- Types of modes
- Formulas for rectangular rooms
- Software to do calculations
- Eventual simulations
- Bolt area

Acoustic isolation and the transmission of noise

PART III – Acoustic parameters and measurements

Acoustic standards and requirements for a studio – setup and measurement

Frequency response, how to utilize it and what to interpret

- Filtering in 1/3 of the octave

Measurement techniques for the study of sound

- Instrumentation
- MLS
- Sine sweep

Practical case of measurement and analysis with software

- Prepare a tutorial with REW

PART IV – The study of recording and musical production

Approach to the design of a studio:

- 1) The choice of location
- 2) Listening point/area



SCUOLA DI MUSICA DI FIESOLE

FONDAZIONE – ONLUS

iscritta al n° 6 del Registro Regionale delle Persone Giuridiche Private

- 3) Acoustic isolation
- 4) Acoustic design
- 5) Positioning of the sources
- 6) Acoustic absorption
- 7) Acoustic diffusion
- 8) Ergonomics – 10 steps:
- 9) Aesthetics
- 10) Electronics – (auto)calibration

EXAM PROGRAMME:

The exam will consist of:

- Written exam with questionnaire (1 hour).

BIBLIOGRAPHY:

- “Dispense e presentazioni del corso” Donato Masci e Cecilia Torracchi.
- “Fisica nella Musica” Andrea Frova, edizioni Zanichelli.
- “Manuale di Acustica” Alton Everest, edizioni Hoepli.
- “L’acustica per il musicista. Fondamenti fisici della musica” Pietro Righini, edizioni Zanibon.
- “Acustica Musicale” Salvatore Pintacuda, edizioni Curci.
- “Acustica Musicale e architettonica” S. Cingolani, R. Spagnolo, edizioni CittàStudi.