ADMISSION TESTS FOR ELECTRONIC MUSIC (specialization in composition) AND APPLIED MUSIC

ADMISSION

To access the Electronic Music bachelor courses it is necessary to take the following admission tests:

1. Practical test of Live Electronics
2. Written and practical test of Music Technology
3. Written and oral test of Music Theory
4. Written and oral test of Acoustics
5. Written test of Technical English

It is possible to be admitted with educational debts in a maximum of two subjects, as long as Music Technology nor Live Electronics are one of them.

ADMISSION TESTS

(only for candidates who pass pre-selections)

1 • Practical test of Live Electronics

Introduction to Live electronics
What Live electronics is and what is not
Expert use of MIDI protocol in a live performance
Hardware for live electronics (controllers)
Software for live performances: Ableton
Use of the “Session” part of Ableton.
The use of Ableton and its strategies in a live performance
Using “effects” for audio processing
“Controllerism”, that is how to play with controllers
Introduction to Native Instruments “Reaktor”
Introduction to Cycling 74 Max/Msp
Max for live: integrating Ableton with Max.

2 • Sound engineering test

Obligatory open-ended questions plus two optional ones. Patch-bay designing and exercise on the mathematical aspects of the working principles of compressors and expanders.

TOPICS (written test)

1 • Being a sound engineer, issues, and responsibilities. Course structure. Review/recap of physical characteristics of sound (objective and subjective, period T, frequency F). Acoustic and electronic sonic chain; transducers. Types of analogue signal (mic, line, and speaker); magnitudes.
2 • Balanced and unbalanced signals; DI-Box. Types of cables (shielded coaxial, shielded twisted pair, speaker); essential types of connector (live and in the studio). An overview on stereophony.
3 • Converting a signal from balanced to unbalanced and viceversa, from stereo to mono, etc.
Types of diffusion (Full-Range, Bi-amp, Tri-amp), cross-over, studio monitors. The acoustic environments in a recording studio (acoustics needs, professional roles, areas).
4 • Environments, areas, signal routing in a live context.

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2 • Sound engineering test

Small, medium, large sized live performances: Stage-Box, multicord, FOH, PA, stage, channel list, Splitter. Types of Splitter: passive, passive with decouplers, active.
5 • Stages of production in a Studio: Recording, Mixing, Mastering, and relevant in-depth analysis. Signal routing in a Studio. Types of mixer: Live and in a Studio (input sections and master). Channel strip: block diagram and introduction.
6 • Input area: definition, pad, Db, gain, level meters, S/N ratio. PFL: outline of a control room.
7 • Overview/in-depth analysis of filters: definition, types, characteristics; filter bank. The EQ section: definition, shelving, peaking, Q, effect layering. Sonic perceptions in different frequency bands. Ghost EQ. Practical examples and era training.
8 • Fader section: definition, transfer function, mute, block diagram. Pan-pot: definition, signal management. Channel Assignment section. Group section: definition, physical outputs, assigning to master, applications, block diagram. AFL.
9 • Pre and Post fader Aux section: definition, mono and stereo monitoring management, effect management, definition of “effect,” parallel connections, block diagram.
10 • Tape Return section: definition, Direct out, level management on a multitrack recorder, block diagram. Mix A and Mix B. Master section: Control Room, Mono compatibility, PFL/AFL Trim, Oscillator, Studio Phones, Talkback, Stereo Input.
11 • Patch-Bay: definition, features, design criteria, use, and optimization. The concept of normalled and half-normalled operation. Design exercises.
12 • Multitrack recording: an overview of recorders used nowadays and our needs. Introduction to HD24. dBfs scale, HD24 meter: momentary, continuous, no peak hold. Song structure: intro, verse, chorus, solo, bridge, coda. Locate: concept, definition, application. HD24 structure: HD, project, song, locate. Counter: H, m. s. ff, frame concept. Transport: play, stop, rec, ffwd, rew. HD24 display. Locate management on the HD24: locate 0, set locate, locate button, locate select, direct recall. Input switch, arming tracks: Input and Rec led. Loop: concept and definition, the loop on HD24, Auto-Play and Auto-Return functions .
13 • Introduction to ProTools and its similarities with HD24: general description, creating a session, transport bar, markers, loop,

	Punch-in, Punch-out, Auto Record, Loop Record. Input Functions: Input Only Monitor ed Auto Input Monitor (definition and applications). 14 • Types of Signal Processors: dynamics and effects. Insert hookup: balanced, send and return, unbalanced, Y type, different uses of Insert. Dynamics concept. 15 • Compressor: changing dynamics and timbre, parameters, mathematical pattern, knee, exercises. Block diagram, Key input, Side-Chain, applications. Limiter: parameters, mathematical pattern, applications, exercises. 16 • Expander: dynamic action, parameters, mathematical pattern, block diagram, exercises. Gate: parameters, mathematical pattern, applications, block diagram. 17 • Patch updating through Insert connection. Graphic Equalizer: definition, parameters, applications, constant and variable Q. Enhancer: definition, parameters, block diagram, applications. Exciter: definition, parameters, block diagram, applications. Demo. 18 • Types of effect processors: environment, delay, modulation. Reverb: acoustics of environments, RT60, parameters, types, applications. Examples of professional devices in use, listening. 19 • Echo: acoustics of environments, tape echo, parameters. Delay: principles, block diagram, parameters, BPM, types, applications. Modulation effects: Tremolo, Vibrato, Phaser, Flanger, Chorus (principles, block diagram, BPS, applications). Listening.
2 • Practice test of Sound Engineering	Wiring the signal path of a studio, recording on HD24, analogue mixing with HD24 using OUTBOARD

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3 • Written and Practice test of Music Technology	PART 1: SYNTHESIS OF A SOUND A brief history of the analogue synthesizer: The birth of the analogue synthesizer The two fathers of the synthesizer: Moog and Buchla. Modularity of first synthesizers “Switched on Bach” and the birth of Moog-Mania The birth of the first integrated synth: Moog’s Mini Moog The introduction of ARP and EMS in the market The concept of voltage control The 3 parameters of sound, according to subjective and objective terminology Pitch-Frequency Volume-Amplitude Timber-Spectrum/wave An example of Voltage-Frequency correspondence 1Volt/octave Limits of first synths Substantial monophony Lack of memory for patch saving The two reasons for substantial monophony Why multiplying the modules that make up a voice channel Control keyboard generating one voltage only at a time. First synths that were able to go beyond those limits Oberheim Four Voice EMU’s digital scanning keyboard Sequential Circuit Prophet 5 The first integrated polyphonic synth able also to save all parameters of a patch The entry of Japanese brands (Roland, Korg, Yamaha) in the western market A closer look at Synth modules Dividing synth modules into 3 categories: sources, modifiers, controllers Further division of controllers into Manual and Automatic VCO (Voltage Controlled Oscillator) VCO parameters controlling and adjusting frequencies The four main waveshapes of VCO (sawtooth, square, triangle and

3 • Written and Practice test of Music Technology

sine) and their spectrum.
VCO parameters controlling and selecting a waveform
VCF (Voltage Controlled Amplifier)
The 2 primary filter types (highpass and lowpass) and their 2 combinations (bandpass and notch).
Cut-off frequency definition
Roll-off slope
Resonance
VCA (Voltage Controlled Amplifier)
The Gate signal
Envelope generator
Detailed analysis of a 4-stage ADSR and its control through a gate signal
LFO
Observations on frequency adjusting and wave shape selection in an LFO, creating Vibrato, tremolo and auto wah-wah
The 3 rules for the block diagram of a patch.
Signal outputs to the right
Modifier inputs to the left
Controller inputs below
Noise generator
Definition of white and pink noise
Main applications of a noise generator
Keyboard tracking
The importance of cut-off frequency control through keyboard
LFO Reset Input
The control signal of Velocity
Audio Modulation
Sideband creation
Description of the main audio modulation techniques (AM, RM, FM)
Sample & Hold
Synchronization between oscillators
The use of synchronization for creative and fixing purposes
Retriggering in an envelope generator
Analysis of the structure of a Moog Mini-Moog
Analysis of the structure of a Roland Juno 6/60
Analysis of the structure of a Sequential Prophet 5

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3 • Written and Practice test of Music Technology

Analysis of the structure of a Korg MS-20
Analysis of the structure of an ARP Odyssey

PART 2: DIGITAL AUDIO AND SAMPLING BASICS

CMI Fairlight, the first sampler
Music trends and instruments before sampling
Luigi Russolo and “Intonarumori”
Musique Concrète
Chamberlain and Mellotron
The sampling process
Sampling frequency
Bit depth
Memory
Basic use of a sampler
Controlling and transposing a sample through keyboard
Start and End of a sample
Loop
Reverse playback
The different directions of detailed sampling
Horizontal multi-layer sampling
Vertical multi-layer sampling
Sampling the differentl articulations of an instrument and managing the result through keyswitch
Release samples
The playback of several different samples in Round Robin
Sample playback streaming from hard disk
An introduction to Native Instruments Kontakt
Audio-MIDI Setup
Loading several instruments to make Splits and Layers
Controlling instruments through differentiated MIDI channels
An introduction to Magix Indipendence
Audio-MIDI Setup
Loading several instruments to make Splits and Layers
Controlling instruments through differentiated MIDI channels
How to create your own instrument assembling samples on the keyboard

3 • Written and Practice test of Music Technology

Analysis of the different types of electronic instruments currently on the market
Analogue synthesizers
Virtual Analogue
Samplers
Synthesizers using ROM memory as a source (ROMpler)
FM synths
Wavetable synthesis (PPG Wave 2.2 and its successors)
Physical modelling synthesis
Additive Synthesis and Resynthesis
Electro-mechanical keyboard emulators
The Hammond organ, electric organs (Vox, Farfisa etc.), Rhodes electric pianos and Wurlitzer, Clavinet

PART 3: MIDI INTERFACE AND SEQUENCING

A brief history of MIDI interface
Hardware features of the interface
MIDI ports and connections
MIDI protocol
The structure of messages
Channel messages
Note ON and Note OFF
Polyphonic and channel Aftertouch
Pitch Bend
Program Change
Control Change
The most common Control Changes
The Bank Select
14- and 7-bit Control Change
The Running Status rule
System messages
Synchronization messages
Auxiliary functions
Manufacturer and Universal System Exclusive
An introduction to Sequencers
A brief history of the analogue Sequencer

saint Louis College of Music since 1976

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3 • Written and Practice test of Music Technology

The advent of digital Sequencers
The MIDI sequencer
Observations on the mono- and multi-timbral possibilities of electronic instruments
The MIDI surrounding a Sequencer
The Soft Thru function
Rechannelling
Providing your computer with MIDI ports
Multi-port MIDI interfaces
Local ON/OFF
An introduction to Cubase
Creating a new project
Project window description
How to open a virtual instrument
MIDI recording settings
Difference between MIDI and Instrument tracks
Balancing several instruments and hiding unnecessary channel strips through the Mix Console window
The 4 values of position
Introduction to Key Editor

4 • Test of Music Theory

The test of music theory for the academic course admission consists of a written test with open questions and multiple-choice answers, plus an oral and practice test on the following programme:

Sound characteristics
Note names
Knowledge of the piano keyboard, octave, tones and semitones
Key signatures, accidentals (flat, sharp, natural)
Notes and stave
Reading of notes on treble clef and bass clef and on a great stave.
Simple and compound intervals
Inversions
Note duration, rhythm, meter

4 • Test of Music Theory

Dots and ties (applied to values, portamento, and phrases)
Simple and compound meter, irregular note groups and triplets
Rhythmic and spoken solfeggio (from lesson 1 to 5 of Avena's "Teoria e Armonia-Prima parte")
Sung solfeggio from exercise 1 to 37 and from 138 to 149 of Pozzoli's "Corso facile di solfeggio-Prima parte"
The concept of shuffle and swing
Transcription of easy drum beats on a key editor and on a stave.
Major triad and its inversions with relative notation through chord symbols and on a stave, execution on the keyboard
Major scale and relative key signatures, execution on the keyboard
Minor triad and its inversions with relative notation through chord symbols and on a stave, execution on the keyboard
Minor scales: natural, melodic and harmonic.
Augmented triad and its inversions with relative notation through chord symbols and on a stave, execution on the keyboard
Diminished triad and its inversions with relative notation through chord symbols and on a stave, execution on the keyboard

RUDIMENTS OF PIANO PLAYING

Execution of one of the first 30 exercises in "Scuola preparatoria del pianoforte" by Beyer
Execution of major and minor triads in root position, playing the fundamental with the left hand and the chord with the right hand in first, second and third position on the descending circle of fifths (or circle of fourths)
Execution of a whole octave on a major scale (hands together), going from no alterations to 5 alterations in the key signature
Execution of a whole octave on a melodic, harmonic, natural minor scale (hands together), going from no alterations to 3 alterations in the key signature.

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MINOR SUBJECTS

5 • Written test of acoustics

Calculating the module of equivalent nominal impedance for a two-port passive network (resistors-coils-condensers) and the resulting power (RMS or peak) absorbed by that network, when power is supplied by an A.C. generator.

6 • Oral test of acoustics

Roots and powers: definition and properties. Cartesian plane.
Functions: definition, examples, and graphics.
Logarithms and exponentials: definition and properties. Decibel as a measurement of sonic level intensity. Physical quantities and relevant units of measurement of an MKS system. dBSPL, dBm, dBu, and dBV.
Trigonometry: trigonometric circle, sine, and cosine, the concept of periodic function, the definition of a radian, measurement of large and negative angles in degrees and radians.
Prosthaphaeresis and Werner's formulae.
Mass-spring harmonic oscillator: equation of motion for one-dimensional oscillations $y(t)=A(t)\sin(2\phi ft+\phi)$). Period and frequency: definitions and relationship. Amplitude and phase concept. Acoustic medium and wave length, $c=\phi f$ relationship.
Physical, acoustic and musical equivalent of amplitude, frequency, and phase. Harmonic frequencies and partials, overtones and pitches of relevant intervals. Spectrum and timbre. Pink noise and white noise. Visualization in the time domain (oscilloscope) and in the frequency domain (spectrum analyzer) of a wave. Examples of periodic functions: square wave, sawtooth wave, triangle wave.
Fourier Theorem for periodic functions.
Representation of a square, sawtooth and triangle wave in the time and in the frequency domain. Fourier Theorem for non-periodic functions: discrete and continuous spectra.
Parameters identifying a timbre: spectral content and spectral evolution.

6 • Oral test of acoustics

SYNTHESIS TECHNIQUES
General principles, physical and mathematical modelling synthesis. Simple, random (noise generators) and Low Frequency Oscillators (LFOs).
Tremolo and vibrato. Envelope generators. Algebraic operators. Additive synthesis. Harmonic and inharmonic spectra. The envelope in an amplifier.
Subtractive synthesis. Introduction to the concept of filtering. Low-pass, high-pass, band-pass and band-stop or band-reject filters. Order of a filter. Cut-off frequency and Quality Factor (Q factor). Envelopes in filters.

PSYCHOACOUSTICS
The beat in acoustics. Critical bands. Introduction to psychoacoustics. Physiology of the human ear. Inner, middle and outer ear. Recognition Hypothesis of a wave's intensity and frequency. The hearing field. Absolute and difference thresholds. Loudness perception level and its measurement. Intensity variation. Pitch perception and its measurement. Pitch variation.
Sum of several different sounds and their intensity. Masking. Combined sounds. Space- and time-related psychoacoustic phenomena. Consonance and Dissonance. Pythagora's theory of proportions, Helmholtz-Plomp's theory on harmonic consonance, Schouten's theory of residual pitch.
Listening of CDs with acoustic phenomena treated in the course.

COMPUTER
Analogue and digital information. Representing numerical data. Decimal, binary and hexadecimal numbers. Bit, nibble and byte. Basic conversions.
The architecture of a computer: Von Neumann machine. Central Processing Unit (CPU): ALU and CU. Primary storage and secondary storage. Inputs and outputs. Processing power. Serial and parallel transmission, synchronous and asynchronous.
Features of memory: storage capacity, read access time, read/write cycle, reliability.
Volatile and non-volatile, static and dynamic, random and sequential access memories.

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6 • Oral test of acoustics

Flash memory, Magnetic and optical data storage.
A brief overview of microprocessors and their development technology.
Motherboard. CISC and RISC architecture. Multiprocessor architecture. ROM memory. RAM memory: dynamic (SDRAM) and static RAM (SRAM). SIIM and DIMM modules.
Virtual memory. Cache memory (L1 and L2). Buffer. System and Local buses. ISA, EISA and PCI architecture. Plug & Play and Hot Plug. Peripheral connections: serial, parallel, SCSI, EIDE, USB, Firewire ports.

ANALOGUE ELECTRONICS
Atomic structure. Electric actions: electrification by friction and charge conservation law.
Structure of materials: metals and insulating materials. Concepts and definitions of force, electric field and potential in vacuum or in the presence of dielectric materials in relation to gravitational force, field, and potential.
Electrostatics: capacitors and their capacity. Charging and discharging of a capacitor in vacuum or in the presence of dielectric materials. Expression of a flat-plate capacitor's capacity. Capacitor systems: in series and in parallel.
Electromotive Force (E.M.F). Electromotive force generator. Electrochemical effect. Electrical current. Ohm's law. Resistance and its expression. Resistance systems: in series and in parallel. The concept of dissipated current, Joule effect.
Theory of electric circuits and continuous current. Definition of node, branch, and mesh. The point rule (Kirchhoff's first law). Examples and exercises.
Electromagnetism: characteristics of magnetic fields, coil, inductance and its mathematical representation. Electromagnetic effect. Lenz law. Electric circuits and alternating current. Network voltage. Maximum and effective value of amplitude.
Pure ohmic, inductive and capacitive circuits. Capacitive and inductive reactance. Impedance and expression of an impedance module. Short and open circuits. Decibels used for power and tension: dBm, dBu, and dBV. Input/output relationship in a circuit: transfer gain and padding functions. Gain and padding

6 • Oral test of acoustics	expression in dB. Passive filters: characteristics and design. Order and slope of a filter. Cut-off frequency. Examples of passive filters: RC lowpass filter, RC highpass filter, RL lowpass filter, RL highpass filter, RLC bandpass filters. Resonance frequency, Quality factor, and bandwidth. Operating principles of a cross-over and overview of its design.
7 • Technical English test	Grammar basics: regular/irregular verbs, comparative and superlative forms, countable and uncountable nouns, tenses and their use (present perfect/present perfect continuous, simple past, future forms), prepositions. An overview of pronunciation: Focusing on vowel sounds in English and the most common mistakes italians make when pronouncing English words. Technical jargon and terms: terminology related to drums, guitar, wind instruments, synths, editing, recording and performing techniques, mixing boards and their components, music theory and practice, acoustics.
8 • Interview	Interview with the board of examiners and discussion about the tests held. Presentation of any previously created or designed works.

ATTENTION:

Please note that attending the pre-academic year is strongly advised for those who want to be admitted to the electronic music course. The above tests are based on the exact content of the pre-academic year of Sound engineering & Electronic music, the essential foundations to proceed towards higher level studies.