MUSIC PRODUCTION
THEORY EXAM AND AUDIO PROJECT INFORMATION

THEORY EXAM – TOPICS LIST

The Theory Exam will feature about 70+ multiple-choice questions on these topics:

- **Acoustics Basics and Digital Audio Recording** (dynamic and frequency range, speed of sound, sound power, sound pressure level and loudness, distance, sampling theory, digital audio)
- **Digital Audio Formats, Drivers and Plugins** (dynamic and frequency range, audio formats, word-clock and sync, audio driver architectures, plugin standards, VST2 vs VST3, 32- vs 64-bit OS and plugins, audio file formats)
- **Microphones and Stereo Recording** (technical specifications, condenser/dynamic/ribbon, polar patterns, stereo recording techniques, ITD & IAD, A-B, X-Y, ORTF, NOS, OSS, proximity effect, clipping and distortion, comb filtering, using multiple microphones, setup examples)
- **Audio Effects** (hardware vs software, native vs DSP, signal routing, effect groups description and parameters, filters and EQs, dynamic processors, modulation effects, reverb, delay, saturation, distortion, amp and speaker emulation, tape emulation, console channel strips)
- **Mixing and Mastering** (mixer, signal routing, pan and balance, insert and send/return FX, technical mix parameters, musical goals in a mix, places from where to start mixing, how to prevent instruments "fighting" with each other, positioning sounds in the stereo field, setting the stereo width, the mixdown, mastering tools and effects, mastering EQ and compression, multi-band compressor, brickwall limiter)
- **Automation** (analog consoles, digital consoles, digitally controlled analog consoles, VCA and motor-fader automation, total recall, snapshot automation, total automation, automation modes)
- **Acoustics and Studio Design** (soundproofing: mass principle, mass-spring-mass principle, room within a room construction, NC curves; acoustic control: acoustical requirements, room parameters, room shape and proportions, eigenmodi, room size and rev time, control room types and layouts)

The evaluation of the Theory Exam accounts for 40% of the final grade.

AUDIO QUESTS

The *Music Production Quest 1 and 2* account for 20% of the final grade. Details about the Quests are provided in a separate PDF.

AUDIO PROJECT – EVALUATION CRITERIA

The end-of-semester audio project will account for 40% of the final grade and will be evaluated from these aspects:

- Composition and Arrangement:
    - overall form and structure
    - choice of sounds and instruments
    - quality of the melodic and harmonic parts
    - stylistic elements (whether the used elements match the chosen music style)
- Complexity: number of tracks/instruments/parts
- Sound Design: use of innovative and complex synthesizer parts or mixing effects
- Live Elements: quality of the recording, editing and integration into the piece
- Mixing: balance, panorama, EQ, dynamics, use of reverb and delay effects to achieve depth
- Mastering: tonal balance, dynamics, saturation/distortion, limiting, master peak and loudness level

AUDIO PROJECT LENGTH AND COMPLEXITY

The project should be between 3 and 5 minutes long and include at least the following elements:

- one or 2 <u>rhythm tracks</u> (for example: 1 perc. and 1 drum loop, or 1 perc. loop + 1 programmed drum track)
- <u>bass</u> (for example: acoustic bass, e-bass, or synth bass)
- <u>melody</u> (for example: a vocal part or instrument such as guitar, flute, oboe, clarinet, violin, etc.)
- <u>chord elements</u> (for example: piano, e-piano, Hammond organ, synthesizer)
- <u>additional elements</u> (such as pads, effects, additional synth lines, etc.)

Total elements: 12 – 16 (each drum sound counts as an element)

Apart from the drum and percussion tracks, that could be also based on WAV loops, the other elements should be VST instruments (with own programmed patterns and sequences), external MIDI synthesizers/samplers, or live instruments.

Additionally, the project should fulfil the criteria defined in your own *Manifesto* at the beginning of the semester.

The audio project can also originate out of one of the *Music Production Quests 1 and 2*, as long as it fulfils all other criteria.

LIVE ELEMENTS AND SOUND DESIGN

At least one live recorded instrument or live recorded vocals are required, regardless of whether you had defined this in your manifesto or not. It is recommended to integrate your own programmed synthesizer patches in the project, as well as plugin effect chains for creative sound design.

FORM AND STRUCTURE

The track must be clearly structured and have at least 2 contrasting thematic ideas (A and B).

For example, it could be structured as a simple song:

- Intro
- A^1 (verse 1)
- B (refrain)
- Break (can be a similar texture as intro)
- A^2 (verse 2)
- B (refrain)
- Outro (can be a similar texture as intro and break)

Other possible forms:

- Theme with Variations: $A^1 – A^2 – A^3 – A^4 – A^5$ ... (can be used for techno/trance/electronica)
- Complex Song: Intro – A^1 A^2 (verse 1+2) – B^1 (refrain) - C (bridge) – break – A^3 A^4 (verse 3+4) – B^2 B^3 (refrain x2) – Outro
- Sonata/Concerto Form (Exposition – Development – Recapitulation)

MUSIC STYLE

Most music styles will be accepted, provided the piece fulfils the requirements for complexity, thematic development, and structure. Here some examples:

Pop (ambient/electro/country/dance/euro/latin/rock/progressive/K-pop/J-pop/C-pop/etc.);
Rock (classic/hard/punk/indie/grunge/garage/country/progressive/symphonic/opera/space/psychedelic/etc.);
Metal (heavy/death/trash/black/industrial/progressive/grind/etc.); **Hip Hop** (rap/soul/trap/industrial/underground/etc.);
EDM; **Trance** (acid/dream/goa/euro/progressive/vocal/etc.); **House** (funky/acid/deep/future/electro/etc.);
Techno (hardcore/acid/rave/ambient/dub/industrial/minimal/etc.); **Chill-Out** (chillwave/downtempo/downbeat/trip hop/etc.);

Drum'n bass (breakbeat/breakcore/hardstep/darkstep/techstep/jungle/etc.); **Industrial** (dancehall, chiptune, grime, etc.);
Reggae (dub/ragga/jungle/raggastep/etc.); **Dubstep** (brostep/trap music/EDM trap/future garage/post dubstep/etc.);
Ambient (dub/dark/drone/new-age/reductionism/etc.); **Hauntology** (synthwave/retrowave/chillwave/vaporwave/etc.);
Bass Music (future bass/jungle terror/wave/hardware/etc.); **Garage** (speed/2-step/wonky/etc.);
Folk (traditional/contemporary/rock/indie/neo/etc.); **World/Ethnic** (worldbeat/ethno-jazz/ethno-fusion/etc.);
R&B and Soul (alternative/contemporary/freestyle/funk/fusion/neo soul/psychedelic soul/etc.);
Jazz (acid/bebop/cool/ethno/blues/funk/fusion/rock/latin/progressive/ounk/soul/swing/etc.);
Avant-garde and **Experimental** (danger music/lo-fi/electroacoustic/musique concrete/progressive music/etc.);
Contemporary Classical (neoromanticism/modernism/computer music/post-modernism/minimalism/post-minimalism/etc.);
Soundtrack (orchestral/hybrid/etc.).

DAW SOFTWARE

The main mixing and mastering must be performed in Steinberg Cubase Pro or Avid Pro Tools. It is also possible to start a project in a different DAW (for example Logic Pro, Ableton Live, Propellerhead Reason, Reaper), then the tracks should be exported as WAV24 and imported into Cubase / Pro Tools for final mixing. Proof of work with Cubase / ProTools must be presented, either in form of direct access to the project files on a mobile HD drive or USB-stick, or (if this is not possible) as screenshots of the project folder and of the open project window (with the tracks and elements clearly visible).

MIXING

These are the most important aspects you should consider when mixing:

- Main musical goals: Focus, Interest, Personality
- Balance between the elements (relative level of the tracks: foreground, middle ground, background)
- Panorama (position in the stereo field) and Stereo Width (tip: stereo dual panner)
- Depth placement (using reverb and delays)
- Placement and range in the frequency spectrum (choice of instruments and texture, use of filters and equalizers)

Mixing tips:

- Do not try to mix everything "loud"! Some elements such as melody or vocals, as well as drums, should be more present than others such as chords, pads and effects.
- Panorama: distribute the elements across the stereo image in an exciting way, but leave main elements such as BD, SD, bass and melody/vocals in the middle.
- Depth: the dry/wet balance, or the amount of signal you send to those effects, will affect the forward and back positioning of elements.
- Use at least a couple of reverbs (with different settings), or a reverb and a delay to give space to your mix.
- Do not use too many equalizers and filters: often less is more. If you have the feeling an element has too much bass or high frequencies, just use a shelving or tilt EQ.
- You can try chorus or other modulation effects (such as flanger and phaser) on background effects, vocals and pads.
- Keep the mix interesting by adding some new element after the middle break (often it is enough to add a small rhythmic element, like an additional tambourine, shaker or hi-hat, or an additional guitar or synth line).

MASTERING

The output of your mix should not exceed +3 / +4 dBFS before adding master chain effects. You can then add a *Compressor* and a *Brickwall Limiter* to reduce the gain of those peaks to -0.2 dBFS (standard for mastering).

Optional effects in your master chain: Virtual Tape Machine, Mastering EQ (Manley Massive Passive, NI Passive EQ, Millennia nseq-2, etc.), Console Emulation (Slate VCC), M/S Saturator (like the Vertigo VSM-3), etc.

The Limiter should feature *True-Peak Limiting* and *Oversampling* to avoid inter-sample clipping, like here in FabFilter Pro-L2:

Try not limit more than 3-4 dB in the loudest passages, or you might lose clarity on the transients or even get distortion.

An alternative to a standard limiter is a *Clipper/Saturator*, like the Limiter N. 6 from Vladg.

- ▪ Free download: https://vladgsound.wordpress.com/plugins/limiter6/).

Here I usually just activate the last 2 sections (the Clipper with *Upsampling* activated and the Protection set as *ISP precise*).

More Mixing and Mastering tips:

- ▪ http://digitalnaturalsound.com/images/stories/fh_mma_courses/pdf/mg_mixing_and_mastering_tips.pdf

LOUDNESS

The Integrated Loudness (for the whole track) should be between -10 and -14 LUFS (depending on the target platform and music style, see under). The Short-Term Loudness should not exceed -9 LUFS for the loudest sections (such as refrain). Use iZotope Studio RX (in demo mode) or Cubase in-built Loudness Meter to measure the loudness levels.

Here some target Integrated Loudness values for the most popular audio platforms:

Platform	Integrated Loudness
Spotify	-14 LUFS
YouTube	-14 LUFS
Tidal	-14 LUFS
iTunes/Apple Music	-16 LUFS
CD Audio	-14 / -12 LUFS recommended -10 LUFS for tracks intended to be loud

About CD Audio: Unfortunately, there is still no Loudness Normalization standard. The limit is 0 dB FS for the peaks (-0.2 is better). CDs are often mastered "as loud as possible", at the cost of distortion and poor audio quality (see "Loudness Wars").

FILE NAMING POLICY, AUDIO FORMAT

File naming policy:

- firstname_lastname_track-title_mix-or-master_version_date(YYYYMMDD).wav

For example:

- Nigel_Stanford_Cymatics_Master_V2_20220125.wav

The main projects and audio quests must be delivered in the following audio format:

- WAV/AIFF/FLAC Stereo, 24-bit resolution, 44.1/48 kHz sampling rate

MP3 or other lossy file formats will not be accepted.

DEADLINES

Project Presentation: the last lesson at the end of the semester in January.
Final project and quests delivery per MyDrive (after feedback given during the presentation): 7th of February.

FILE DELIVERY

Project presentation and final project delivery: upload your audio file using **MyDrive** (https://www.mydrive.ch/).
Folder: / FH / FH / MMA_BAKK / MMA_B_JG_202X / Music_Production / _End-Of-Semester Project /
The Login details will be provided separately per Email.

File compression: only ZIP is accepted. WinRAR and other non-standard methods must be avoided.

In case you use USB-Sticks: you must format it as a FAT32 or exFAT partition using MBR (must be readable by both Windows and Mac OS X).

Note: USB-Sticks formatted with Mac OSX "El Capitan" ot later might not work under Windows, unless you access the advanced options. The Disk Utility advanced options of El Capitan are hidden. Please follow these steps to make them available:

1. Quit Disk Utility
2. Open the Terminal utility
3. Run the following Command: *defaults write com.apple.DiskUtility advanced-image-options 1*
4. Relaunch Disk Utility

Now, just format your USB-Stick with MBR Partition (Master Boot Record) and exFAT file System.
The USB-Stick now can mount in OSX & Windows.