**ECS730: Digital Audio Effects** Spring 2014 (Semester 2)

Course Information Sheet

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| **Lecturer:** | Josh Reiss (josh.reiss@eecs.qmul.ac.uk) |
| **Schedule and Location:** | Fridays, 9am-11am, Engineering Eng. 2.09  Fridays, 12pm-1pm, Engineering Eng. 2.07  *(Yes, the module meets at two separate times and places on the same day. We will sometimes use the second slot for guest lectures. Stay tuned for further details.)* |
| **Surgery Hours:** | TBD (but feel free to email, phone or just stop by any time),  Office is room E305,This is in the Engineering bridge block above the foyer. |

**Description:**

This module covers the theory and implementation of digital audio effects. Its focus is on the application of digital signal processing to the real-time manipulation of musical audio signals. Most commonly used effects will be covered, including: filtering and equalisation; delaybased effects including echo, reverb, flanging and chorus; dynamic range compression and expansion; modulation and distortion; spatial audio; and time-frequency (phase vocoder) effects. Three programming assignments will cover the analysis of existing audio effects, the creation and modification of an audio effect, and the creation of an original effect of your own choice (most likely as a VST plug-in, but this is not a requirement). Prior experience with VST/C++ programming is not necessary.

**Assessment:**

The marking in this module is split between an exam and three programming assignments:

10% Assignment 1: Analyse the operation of audio effects

10% Assignment 2: Build and modify an example VST audio effect

10% Assignment 3: Create an original audio effect

70% Final Exam

**Reading:**

Reading material is mainly original texts by Josh Reiss and Andrew McPherson, which will be distributed each week through the QMplus site.between two primary sources.

Several textbook are also recommended, especially *DAFX: Digital Audio Effects*, ed. Udo Zölzer (2nd edition), 2011. ISBN: 978-0470665992.

**Objectives and Key Skills:**

This module aims to introduce principles of digital signal processing specifically suited for real-time audio effects and to examine the operation of commonly-used effects. This is a module on *building and creating* effects, rather than on their use. We will discuss common uses and parameter settings for each effect, but primary skills will be on effect design rather than application (e.g. mixing and mastering).

**Approximate Timetable:**

*Subject to change. There will also be guest lectures to be scheduled.*

Week 1 (10 Jan): Fundamentals

Week 2 (17 Jan): Delay-Based Effects

Week 3 (24 Jan): Filter design, **Lab 1- Learning JUCE/VST**

Week 4 (31 Jan): Filter effects: Graphic EQ, Parametric EQ, Wah-Wah, Phasing

Week 5 (7 Feb):, Amplitude modulation **Lab 2- Analysing effects, Assignment 1 Due**

Week 6 (14 Feb): Distortion

Week 7 (21 Feb): Dynamics processing, **Lab 3- Building and modifying an audio effect** , **Assignment 2 Due**

Week 8 (28 Feb): Phase Vocoding, Spectral Processing, Pitch-Shifting, Time-Stretching

Week 9 (7 Mar): Spatial Audio, Head-Related Transfer Functions, **Lab 4- Creating an original effect (part 1)**

Week 10 (14 Mar): Doppler

Week 11 (21 Mar): Reverb, Impluse-Response Convolution P, **Lab 5- Creating an original effect (part 2),** **Assignment 3 Due**

Week 12 (28 Mar): Assignment 3 presentations, review

TBA (May-June): Final Exam