

INTRODUCTION TO COMPUTER MUSIC

AIST2010 Lecture 1

AIST2010: INTRODUCTION TO COMPUTER MUSIC

AIST2010 is a new course

- Thank you to be part of this!

As said in the subtitle:

- “From Analysis to Algorithmic Music”
- This is planned to be a project-based course for engineers to develop an understanding in building music software technologies

COURSE LOGISTICS

Course meetings

- Lectures: T2 @ERB804, H8-9 @LHC101
- Labs: Either T4 or T5 @SHB123 (CSE lab)
 - Due to a number of students' scheduling conflicts, let's have a vote after class to fit everyone!

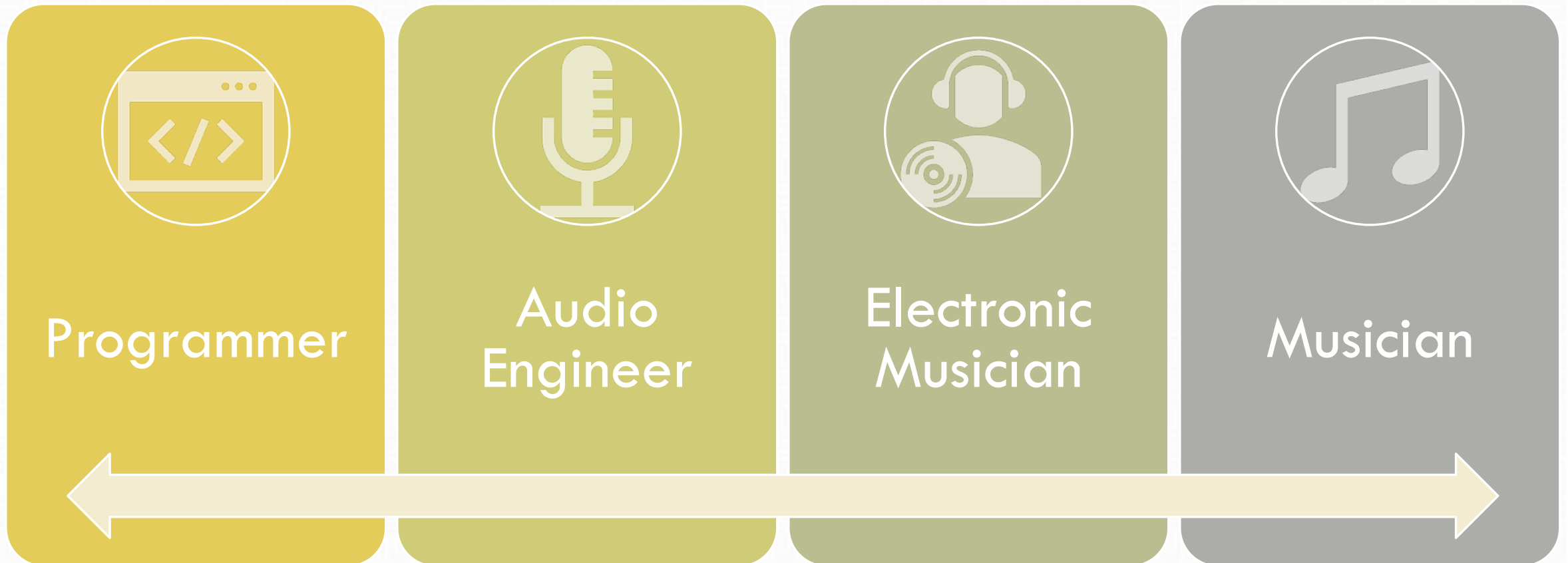
Course instructor

- Dr. Chuck-jee CHAU 周卓之
 - chuckjee@cse.cuhk.edu.hk
 - YIA 1207H

Course tutor

- Zhuolun HE 何卓論
 - zlhe@cse.cuhk.edu.hk
 - SHB 1026

SPECTRUM OF KNOWLEDGE: COMPUTER VS MUSIC



WHAT IS IN THIS COURSE?

*Basic concepts of **digital audio***

Programming experience

- **MATLAB**: sound analysis
- **CSound**: sound synthesis
- **Python**: MIR
- **MaxMSP**: music programming
- **Magenta**: music with AI
- **Euterpea**: algorithmic music

We can never teach you the complete picture in one course

- Explore into one (or more!) of the topics via the course project

*Basic **programming skills** (of any language) is necessary*

- And be prepared for the adventures

WHAT IS NOT IN THIS COURSE?

How can I compose music?
How to use vocaloid?
How to typeset music scores?
How to set up my Hi-Fi?
How to buy good earphones?
*What is the best audio
compression codec?*

*Which synthesizer should I
choose?*

How to use GarageBand?

...

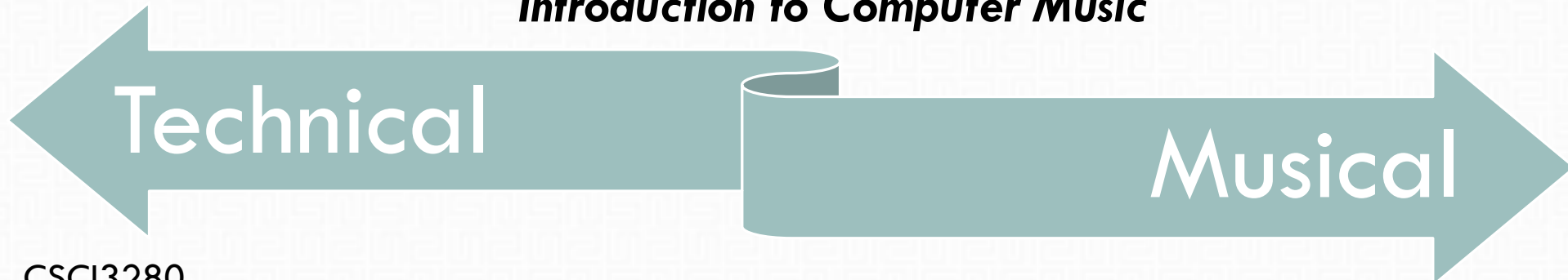
*Yet, some **technical fundamentals**
in this course may be helpful for
you to these questions!*

RELATED COURSES

IERG4190
Multimedia Coding and Processing

UGEB2149
Music, Mind and Artificial Intelligence

AIST2010
Introduction to Computer Music



CSCI3280
Introduction to Multimedia Systems

MUSC2333
Music Information Technology

MUSC3383
Electronic Music

COURSE PLAN

Week	Lectures	Lab
1	Introduction, Real-life vs. Digital Music	No lab
2	Analysis and Visualization	Audacity / SoundVisualizer
3	Music Information Retrieval	MATLAB
4	Audio Synthesis	CSound
5	DSP and Filters	No lab (public holiday)
6	More on MIR	Python
7	Web Audio, Midterm Exam	TBC
8	MaxMSP and SuperCollider	MaxMSP
9	Machine Learning	TBC
10	TensorFlow / Magenta	Magenta
11	Functional Programming and Music	Haskell / Eutrepea
12 & 13	Project Presentation	Project Help

COURSE ASSESSMENT

Labs (20%)

- Submit the ~8 required lab exercises weekly

Midterm Exam (20%)

- Textbook knowledge from analysis, synthesis to MIR

Project (40%)

- Propose your own topic, explore and share with your classmates

Extensive project report (20%)

- A careful elaboration on the journey of project exploration

THE PROJECT

*Work **individually** or in a group of **2 students***

- The amount of work would be assessed

Explore further on one of the topics covered in this course, e.g.

- Implement some music apps/games (synthesis/analysis)
- Data mining on music/audio data
- Understand, extend and improve some open-source projects
- Present and demo to class in the last lecture(s)

Individual writeup of the exploration journey (instead of final exam)

- Excellent projects may be escalated to a “conference” level for submission!

EQUIPMENT FOR YOUR USE

Most of the software we use are open-source or licenced to CUHK

- Audacity, CSound, PureData, ...
- MATLAB: refer to ITSC for installation instructions

The only exception: MaxMSP

- This is a software for music programming, to be introduced in October
- CSE purchased licences are available on several lab machines only
- But you may use the “demo” version for 3 months

EQUIPMENT FOR YOUR USE

A capable laptop is good enough for the course, in general

- You may use your mobile devices for controlling too

MIDI controllers may be useful for some projects

- For our course we have *two* **Roli Seaboard Block!**
- 5D polyphonic MIDI control
- You may borrow it for your course project!

REFERENCE MATERIALS

Here are some useful books/sites that you may read for reference!

- C. Roads, ***The computer music tutorial***. Cambridge, Mass: MIT Press, 1995.
- M. Müller, ***Fundamentals of music processing***. Cham: Springer, 2015.
- V. Lazzarini, S. Yi, J. ffitch, J. Heintz, Ø. Brandtsegg and I. McCurdy, ***Csound***. Cham: Springer, 2016.
- V. Lazzarini, ***Computer Music Instruments***. Cham: Springer, 2016.
- J. Burg, J. Romney and E. Schwartz, **"Digital Sound & Music - Concepts, Applications, and Science"**, Digital Sound & Music, 2014. [Online]. Available: <http://digitalsoundandmusic.com>.

COURSE CONTACT

Blackboard site

- Publishing of lecture and lab materials
- Announcements
- **https://blackboard.cuhk.edu.hk/ultra/courses/_117895_1/cl/outline**

Slack

- Casual Q&A and discussion
- **<https://tinyurl.com/join-aist2010>**

THE WORLD OF COMPUTER MUSIC

Still a highly active research area

- Many questions yet to solve, e.g.
 - The interaction between human and computer on artistic touches
 - More efficient and effective ways for music information retrieval
 - Machine composition and improvisation

Important research labs, e.g.

- IRCAM (Paris, France)
- CCRMA (Stanford University)

Important conferences, e.g.

- ICMC
- ISMIR
- NIME
- See: <http://conferences.smcnetwork.org>

Let's explore together in the upcoming 13 weeks!