Music, Brain, Science and Technology
音樂，大腦，與科技
Syllabus for 2014 Academic Year, Semester II
Department of Computer Science and Information Engineering
National Chi-Nan University

Course Code: 219115, 993090                           Credit: 3 units
Required/Elective: Elective
Prerequisites: none
Classroom: R235, Technology Building I    Office: R401, Technology Building III
Class Time: Tuesday. 9:10-12:00 a.m.
Instructor: Herng-Yow Chen (陳恆佑)
Email: hychen@csie.ncnu.edu.tw    Phone: 049-2492910960#4131
Course website: http://www.csie.ncnu.edu.tw/~hychen/music_brain_tech

1. Course objectives:
   Music defines who we are as human beings. This course is a journey for students and the teacher—who enjoy listening to or making beautiful sound (or noise) —to explore about how music works, how brains perceive, and how technology can help in the way we interact with music. The lectures cover topics from three fields: music, neuroscience, and computer technology, with a special focus on physics of sound, musical acoustics; neuroscience about music perception; electronic music and digital music technology. We will learn to share our music or presentation topics with the class.

2. Instructor office hours:
   Mondays-Fridays 8:30-9:10 am (by appointment)

3. Teaching approach:
   I will present the topics to the class, mainly through slides and multimedia resources. We (students, TAs, and I) will get lots of chances to use different music instruments (acoustic or electrical), devices, and software tools available from my lab to learn how they work and their unique elements like pitch, timbre, rhythm, chords, harmony, scales. Students in the end should focus on a specific topic that interest them, experiment with the idea through projects, and then show the work to the class.

4. Grading criteria:
   Class participation: 40%, Assignments: 30%, Project: 30%

5. Textbook:
   There will be no textbook used for this class. Instead, instructor will prepare slides and selected articles from the following references.

6. References:
   3. This is Brain on Music: The Science of a Human Obsession, by Daniel J.
Levitin, 2006.
7. IEEE Multimedia Magazine (paper reading)
8. Online resources

7. Course schedule (week, topic, activities, evaluation/assignment, text, etc.):
   1. Introduction: music, brain, and science and technology
   2. How sound is made and moves: sound waves
   3. How sound is perceived: perception
   4. Music elements: Pitch, Loudness, Rhythm,
   5. Music elements: Timbre, Overtones, Chords, Melody, Harmony
   6. Music notes and theory: Key, Scale, Major, Minor, Score, Tempo, Notation,
   7. Music in Brain?
   8. Music instruments vs. Electric instruments
   9. --- Midterm week --- students propose their project idea
   10. Stringed Instruments: violin, cello, guitar, ukulele
   11. Brass Instruments: trumpet and trombone
   12. The Woodwinds: clarinet and saxophone
   13. The most versatile instrument: the singing voice
   14. Electric Instrument: electric guitar, piano, drum
   15. Electronic Music, MIDI, Synthesizer
   16. Digital recording, MIDI recording, mixer, sound Effects, composing tools
   17. Applications: MP3, Podcast, iTunes, YouTube, online music learning
   18. --- Final week --- Project presentation

8. Teaching Assistant tasks:
   1. Set up music instruments and software tools
   2. Help students learn, explore and accomplish their interesting work