Circuit Breakers!

Course Number: IM-UH 1110
NYU Abu Dhabi: Fall 2018
Credits : 4
Prerequisites: None – This class is an Arts Practice and Interactive Media elective.
Class Meeting Time: Tuesday 9:00-11:40am and Thursday 9:00-10:15am
Classroom: C3-043
Instructor: Jonny Farrow
Email: jf613@nyu.edu
Class Website: http://circuitbreakers.nyuad.im/
Office: C3-046
Office Hours: Tuesdays 2-3pm. However, I maintain an open door policy. Feel free to stop by my office any time, or send me an email to set up an appointment at a particular time.

Course Description:
Circuit Breakers! is a course designed to introduce students to the world of hardware hacking and circuit bending for artistic and mainly sonic ends. By literally opening up common battery powered objects such as toys and finding their circuit boards, one can change the behavior of the object by simply interrupting the way the circuit normally works. This technique has both predictable and unpredictable outcomes, but it is almost always satisfying. Students will, however, mainly build their own circuits with a minimum amount of components. Many of the projects in this course center on common integrated circuits (microchips), which we will cajole, trick, and abuse in order to create tools for sonic and aesthetic ends.

Intended Learning Outcomes:
Students that successfully complete this course will:

1. Have a very basic understanding of how electrical circuits work, and develop a working knowledge of basic electronic components including but not limited to IC's, resistors, capacitors, and diodes.
2. Be able to construct their own circuits both in prototype and finished, usable forms for presentation and/or performance.
3. Have a basic knowledge of the history and development of hardware hacking and circuit bending, and their contexts in the field of music and fine art.
4. Understand the ethos and culture of hacking and its important place in DIY (do-it-yourself) communities.
5. Learn to provide and receive constructive criticism on work produced in the class.

Teaching and Learning Methodologies
The class meets twice per week and consists of a mix of brief seminar style lectures covering artists and their work, review of assigned readings, and discussion of topics of interest and concern in the field. The balance of the class time will be used for demonstrations of tools and techniques and for students to work on their projects. At the end of a unit on a particular method or project the class will pause to look at, listen to, and critique the work produced. The course will culminate in a public demonstration of and/or performance with the objects produced.

Required Textbooks and Materials
Handmade Electronic Music: The Art of Hardware Hacking 2nd Ed. Nicolas Collins. Routledge (2009).

Suggested Readings:
Make: Electronics: Learning Through Discovery 2nd Ed. Charles Platt. Maker Media, Inc. (21015).

Hacking Electronics*: An* illustrated DIY guide for makers and hobbyists. Simon Monk. McGraw Hill Education (2013).

Fritzing For Inventors. Simon Monk. McGraw Hill Education (2016).

from the Signal Culture Cookbook *(available on reserve in the library)*:

"Hearing the Unheard: Practical Applications for Contact Mics". Bill Sack.
"How to Make and Use a Piezoelectric Contact Mic,". Eric Leonardson.
"Portable Semi-Anechoic Chamber for Recording Small Sounds". Nicholas Economos.
"Tuning FM in Physical/Metaphysical Space". Michael Trigilio and Lee Montgomery.

Other Required Readings:
As assigned.

Attendance, Academic Requirements, and Grading

Attendance and Lateness:
Please note that more than one unexcused absence (two) will result in a partial lowering of your final grade (1/3 letter grade, i.e. B+ to B); three unexcused, a full letter grade (3/3, i.e. B+ to C+); four unexcused (5/3, i.e. B+ to C-). On the occasion of your fifth unexcused absence you will first be asked to withdraw (if before the withdrawal date). In the case of the last scenario, or if you accumulate more than five unexcused absences -- if you insist on staying in the class -- your final grade will likely be F. In the case of a combination of an excessively high number of excused and unexcused absences, the final grade will be assessed on an individual basis.

I calculate **lateness** as a half-unexcused absence (i.e. 2 unexcused latenesses = 1 unexcused absence, etc.). If you let me know before class that you are going to be late, and have a very good reason as to why (like a fender bender, or illness with a note) I will consider waiving an individual lateness. But please note that occasions of arriving late can add up very quickly, so please do not make a habit of coming late to class.

What do I consider to be an **excused vs. an unexcused absence**? An excused absence is one where you are sick and you bring me a note from a medical professional (like from the campus Health and Wellness Center or your doctor), or from another professor (like a class trip), from another department in our university, or a governmental agency that excuses your absence. An unexcused absence is any other kind of absence.

THEREFORE, it is up to you to communicate with me regarding your attendance in a timely manner. If you are sick or having any other issue that is causing you to miss class, please let me know at your earliest convenience so that I may make a note in the roll book. You will find that if you communicate with me, I am very reasonable and fair. But do not wait until the end of the semester to tell me about why you were absent. In any of the above cases, you must make up any work that you miss by the original deadline or by an extended deadline that I will set for you. Depending on the case, this could also mean that you may or may not be eligible to receive full points for the assignment. This will be decided at the instructor's discretion.

Academic Requirements and Grading:
Your final raw grade is distributed across the following categories and calculated as below.
1. Participation 10%
2. Midterm Critique 10%
3. Production of Work 60%
4. Final Critique 20%

Participation (10%): Students are expected to pay attention in class and to actively engage in ALL group discussions, exercises, demos, and activities. Sustained in-class participation and careful reading and review of all assigned materials is a requirement for succeeding in this course. My goal is always to make a space where everyone feels comfortable participating in discussions and critiques. I will be evaluating participation on a rolling basis and will give you feedback on how you are doing as the semester progresses.

Midterm (10%) and Final Critiques (20%): You must be present for all critiques or you will receive no credit for the particular critique missed. Also, you must present your work in the end of semester show, and during the Open Studios Event on 12 November, either as a standalone project or in a performative context (this is

TBD). Additionally, you will more formally present your midterm and final projects in class for group critique as instructed. Guidelines for participating in critiques will be distributed before the first critique and we will review the guidelines prior to the midterm and the final.

Production of Work (60%): The heart of this course is making (and bending) working circuits. You will complete no fewer than eight projects inclusive of the midterm and final. Some of the projects will be very simple and quick (like building a contact microphone), others, like the midterm and finals will require more planning and thought. And project grades will be weighted accordingly. If you come to class and work hard, you will be rewarded, and you will most likely find the process and its results to be very satisfying. There is nothing like the excitement of hearing the screech of your first sawtooth wave circuit come to life, or of hearing the sounds your new contact microphone allows you access to. And like many things in life, hacking and circuit building require patience, focus, a lot of trial and error, and dedication. My aim is to facilitate a studio class space that is collegial, supportive, and where you can do your work and enjoy it. Your participation in this spirit is critical.

Grading:
The difficulty of the project will determine the weight of possible points available for each project. As we go along, I will distribute a grading rubric outlining how one can earn the optimal number of points for each assignment or project, and that explains, overall, what constitutes a grade of 'A', 'B', et cetera.

Course Assignments & Activities
We will be moving rather swiftly through various techniques and projects. Your assignments will involve reading the assigned readings and then digging into the projects described therein. You will spend a fair amount of in-class time working on and testing circuits. We will pause at various times to present and critique work with graded critiques at the midterm and end of the course.

Projects
Each technique will be covered in 2 to 3 weeks, with at least one working project in each of the major categories we cover. A mandatory group critique and studio clean up will occur at the midterm and at the end of the course. All work must be completed on time and be working and ready for critique.

Documentation
Another part of this class will be for you to document your work with still images and video. Process is as important as product. Be sure to make notes as you progress. Together we will build a class archive of your work online to inspire future generations of NYUAD hardware hackers and circuit benders!

Studio Classroom Etiquette and Safety
Good studio classroom etiquette is necessary to maintain a clean, safe and healthy working environment. Class begins promptly at 9:00am. Please reserve the last 10 minutes of class to clean up and straighten your working area, and to return tools. This routine will be critical as more than one class meets in our room. Regarding health and safety, some equipment and materials that we will use are potentially hazardous to your health. Proper use will be taught, but it will be up to you to follow the training in your daily practice. And (always!) don't be afraid stop and ask questions if you feel unsure or uncomfortable of what you are doing. While it may take a bit more time, it is better to pause and regroup than to do something that is hard to undo.

NYUAD Plagiarism Statement:
NYU Abu Dhabi expects its students to adhere to the highest possible standards of scholarship and academic conduct. Students should be aware that engaging in behaviors that violate the standards of academic integrity will be subject to review and may face the imposition of penalties in accordance with the procedures set out in the NYUAD policy.

More info: https://students.nyuad.nyu.edu/campus- life/student-policies/community-standards-policies/academic-integrity/