

COMPUTATIONAL THINKING THROUGH MODULAR SOUND SYNTHESIS

FALL 2022

AUGUST 20, 2022

Sections: UNHP 1100 - 316

Time: Tues/Thurs 11:30 am - 12:25 pm

Place: 226 FedEx Institute of Technology

Instructor: Andrew Olney

Email: aolney@memphis.edu

Office: FedEx Institute of Technology, Room 403e

Office Hours: Monday 2:30 pm - 3:30 pm (**on Zoom**)

Phone: 678-5032

Web: <https://olney.ai>

Description

From the catalog:

In this Honors Forum, students will learn computational thinking concepts and strategies in the context of modular sound synthesis. Modular sound synthesis (modular) is extensively used in the production of electronic music and hip hop. Modular is a method of creating sounds and composing music that exists at the intersection between music, signal processing, and implicitly, functional programming since each module represents a function that performs an operation on sound. However, no code is written in the process; rather, “programming” consists of connecting wires between modules to carry audio or control signals. Each class will pose challenges to create a certain kind of sound or sequence of sounds aligned with the topic of the day. The goal of these challenges is to help the students develop computational thinking skills as they learn to solve musical problems through modular. It is important to note that the course activities require each student to have a laptop to run software that simulates a modular system.

You should take this class if:

- You want to understand how sounds in music are made
- You want to build a skill set relevant to computational fields

Our focus will be on using modular synthesis to solve sound design problems. The course format is minimal lecture and maximal hands-on problem-solving in class.

Objectives

- Explain characteristics of sound as they relate to music.
- Apply computational thinking to solve sound design problems.

Methods and Activities

- Read and prepare questions before class
- Brief class lectures
- In-class labs and activities
- Independent project(s)

Materials

Laptop: You must bring a laptop with a WiFi connection to complete class exercises. **Tablets are not guaranteed to work.**

Book: Olney, A.M. (in preparation). *Computational Thinking through Modular Sound Synthesis*. Available at: <https://olney.ai/ct-modular-book>

Reference resources: Resources we will not directly use in class but which you may wish to refer to are below. Note that several of the books are out of print but can be found in PDF form online.

- Crombie, D. (1982). *The Complete Synthesizer: A Comprehensive Guide*. Omnipress Books.
- Bjørn, K., & Meyer, C. (2018). *Patch & Tweak: Exploring Modular Synthesis*. Bbooks.
- Dusha T., Martonova, A., & Johnston, P. (2020). *Modular Sound Synthesis On the Moon*. Modular Moon.
- Loopop's In-Complete Book of Electronic Music. (n.d.). Retrieved August 20, 2022, from <https://www.patreon.com/loopop>
- Strange, A. (1983). *Electronic Music: Systems, Techniques, and Controls*. William C Brown Pub. **New edition on Kickstarter!**
- Synth Secrets—From Sound On Sound. (n.d.). Retrieved August 20, 2022, from <https://www.soundonsound.com/series/synth-secrets-sound-sound>

Course Schedule

The schedule is approximate and may be revised as the course progresses.

Class	Section	Topics
1	Sound	Introduction & Overview
2		Physics & Perception
3		Harmonic sounds
4		Inharmonic sounds
5	Fundamental modules	Basic concepts
6		Trigger (e.g. controllers)
7		Create (e.g. oscillators)
8		Modify (e.g. filters)
9	Sound design 1	Kick & Cymbal
10		Video game lead & 80's music bass
11	Complex modules	Trigger (e.g. arpeggiators)
12		Create (e.g. frequency modulation)
13		Modify (e.g. slew)
14	Sound design 2	Violin, Minimoog, Roland 303 & Juno 60
15		Project presentations

Grading

Grades will be on a +/- letter scale (e.g. A+/A/A-) with A- starting at 90%, B- starting at 80%, and so on; F is below 60%.

Class exercises (80%) In-class exercises, or labs, will be performed in groups.

Project(s) 20% Projects will be performed in groups; the prototypical project is a short composition where each group member contributes a patch and/or plays.

Attendance & Make-up Policy

Since in-class exercises constitute a significant portion of your grade, tardiness and missing classes will negatively impact your grade.

Work is expected to be turned in on time unless arrangements have been made prior to the due date (including University-sanctioned activities or legitimate religious observances).

No credit will be given for late work.

Extensions are given only under extreme circumstances and with the prior permission of the instructor.

Attempts to falsify attendance records is a violation of the University's Code of Student Rights and Responsibilities (see [Academic Integrity](#) below). Falsification includes entering attendance information for someone else, having someone else report that you attended when you did not, and using a fabricated story in an attempt to obtain an excused absence.

Electronic communications

Course announcements, as well as consultation with the instructor, may occur via e-mail. You are required to activate your university e-mail account in order to be a student at the University. The University considers this account to be your official university e-mail address and will use it to disseminate information. You must either check your university e-mail account regularly or forward your university e-mail to a personal e-mail account that you will check regularly. After you have established your university e-mail account, you can use iAM, the University's identity management service, to forward your university e-mail to a personal e-mail account.

Office Hours

If you have any difficulties during the course, let me know immediately. Office hours are the perfect opportunity to discuss teaching and research issues. Do you want to have more information on a certain topic? Do you have difficulties finding a research question or writing a paper? Do you feel uncomfortable about assignments? Are you looking for work in a research lab? Do you have suggestions or comments? See me during office hours or send me an email.

Equity, Inclusion, and Accommodations

Our class respects all forms of diversity. The University of Memphis embraces the diversity of students, faculty, and staff, honors the inherent dignity of each individual, and welcomes their unique perspectives, behaviors, and worldviews. In this course, people of all races, religions, national origins, sexual orientations, ethnicities, genders and gender identities, cognitive, physical, and behavioral abilities, socioeconomic backgrounds, regions, immigrant statuses, military or veteran statuses, size and/or shapes are strongly encouraged to share their rich array of perspectives and experiences. Course content and campus discussions will heighten your awareness to each other's individual and intersecting identities. In accordance with [UofM Policy GE2004](#), the University will ensure students receive consistent and fair treatment and affirmation of the University's commitment to diversity. The University prohibits discrimination and harassment based on protected characteristics as stated in [UofM Policy GE2030](#).

Please see the instructor if you need accommodations for a disability, or to fulfill cultural or religious obligations. Stu-

dents with requests for accommodations should contact [Disability Resources for Students](#) to register and learn about the services available to support their learning. Students with disabilities are encouraged to speak with us privately about academic and classroom accommodations. It is strongly encouraged that you register with Disability Resources for Students (DRS) to determine appropriate academic accommodations. Disability Resources for Students is located in 110 Wilder Tower, their phone number is (901) 678-2880 (V/TTY), their email is drs@memphis.edu, and their website is <https://www.memphis.edu/drs/>. Disability Resources for Students coordinates all accommodations for students with disabilities.

Qualified students with disabilities will be provided reasonable and necessary academic accommodations if determined eligible by the appropriate Disability Resources for Students staff at the University. Prior to granting disability accommodations in this course, the instructor must receive written verification of a student's eligibility for specific accommodations from the Disability Resources for Students staff at the University. It is the student's responsibility to initiate contact with University's Disability Resources for Students staff and to follow the established procedures for having the accommodation notice sent to the instructor.

Mental Health

As a student, you can sometimes feel overwhelmed, lost, experience anxiety or depression, and struggle with relationship difficulties or diminished self-esteem. Mental health challenges can interfere with optimal academic performance. However, many of these issues can be effectively addressed with some help. If you find yourself struggling with your mental or physical health this semester, please feel free to approach me. I will try to be flexible and accommodating. As your instructor, I am not qualified to serve as a counselor, but UofM offers confidential counseling services on-campus and via telehealth that are available to students taking six or more credits at no cost. UofM Counseling Center is staffed by experienced, professional psychologists, clinical social workers, and counselors, who are attuned to the needs of college students. I strongly encourage you to take advantage of this valuable resource. To connect with Counseling Center services, please visit 211 & 214 Wilder Tower, or call 901.678.2068. To know more about their services, you can visit their website at <https://www.memphis.edu/counseling>. In a crisis situation, please call 901.678.HELP (4357) to speak to the On-call counselor. Remember, getting help is an intelligent and courageous thing to do - for yourself and for those who care about you.

Personal or academic challenges including food & housing insecurity

If you are experiencing personal or academic challenges including, but not limited to food or housing issues, family needs, or other stressors, please visit the [Dean of Students Office](#) to learn about resources that can help. Any student who faces personal challenges including, but not limited to securing their food or housing and believes this may affect their performance in the course is urged to contact the [Dean of Students Office](#) at 901.678.2187 located in the University Center, Suite 359 for assistance. If you are comfortable doing so, please also let the instructor know you are experiencing challenges as they may be able to assist you in connecting with campus or community supports.

Personal Relationships

There are special problems in any personal relationship between individuals where one party possesses direct academic, administrative, supervisory, evaluative, counseling, or extracurricular authority over the other party. Such positions include, but are not limited to, teacher and student or assistant, supervisor and employee, senior faculty and junior faculty, mentor and trainee, advisor and advisee, counselor and client, teaching assistant and student, coach and athlete, and the individuals who supervise the day-to-day student living environment and student residents.

In accordance with [UofM Policy HR5050](#), no University employee shall enter into or maintain any personal relationships with students or with employees over whom they exercise or, reasonably can expect to exercise, direct or indirect control in areas such as academics, administration, supervision, evaluation, counseling or extracurricular authority or influence. No University employee shall exercise any direct or indirect control in the areas of academics, administration, supervision, evaluation, counseling or extracurricular authority over any student or employee with whom that employee had previously been involved in a personal relationship.

Any employee, including faculty, who is currently in a personal relationship or becomes involved in a personal rela-

tionship that might be covered by terms of this policy, must disclose the relationship immediately to Human Resources-Employee Relations and Engagement so that any and all steps are taken to comply with this policy.

Title IX

The University of Memphis prohibits and will not tolerate sexual misconduct or gender-based discrimination of any kind.

Sexual Misconduct & Gender-Based Discrimination

The University is obligated to investigate sexual misconduct (including, but not limited to sexual assault, sexual harassment, stalking, dating violence, and domestic violence). More information about Sexual Misconduct can be found in [UofM Policy GE2031](#).

Disclosure & Mandatory Reporting

If you disclose an incident of sexual misconduct to a faculty member, they have an obligation to report it to the University's Title IX Coordinator. "Disclosure" may include communication in-person, via email/phone/text message, or through in/out of class assignments.

Confidential Resources

If you wish to speak confidentially about an incident of sexual misconduct, please contact the [University of Memphis Counseling Center](#) (901-678-2068), the [University of Memphis Student Health Center](#) (901-678-2287), in Memphis/Shelby County [Shelby County Rape Crisis Center](#) (901-222-3950), or in Jackson/Lambuth [WRAP - Domestic Violence Shelter/Sexual Assault Resources](#) (800-848-0299). If you would like to learn more about sexual misconduct or report an incident, please visit <https://www.memphis.edu/oie/>.

Accommodations for Pregnant Students

Title IX prohibits the University from discriminating against a student based on pregnancy, childbirth, false pregnancy, termination of pregnancy, or recovery from any of these conditions. Title IX also prohibits a school from applying any rule related to a student's parental, family, or marital status that treats students differently based on their gender. Additional information can be found on the Office for Institutional Equity website: <https://www.memphis.edu/oie/resources/>.

Academic Integrity

The University of Memphis expects all student to behave honestly. The [Student Code of Rights and Responsibilities](#) explains what constitutes a violation of our Academic Integrity policy. Please see the Office of Student Accountability's website for more information: <https://www.memphis.edu/osa/>. Plagiarism, cheating, and other forms of academic dishonesty are prohibited. Students who violate the academic misconduct policy, either directly or indirectly, through participation or assistance, are immediately responsible to the instructor of the class in addition to other possible disciplinary sanctions which may be imposed through the regular institutional disciplinary procedures.

Classroom Behavior

Students should be aware of the [Student Code of Rights and Responsibilities](#) which describes examples of unacceptable classroom behavior. Disruptive classroom behavior will not be tolerated. Instructors are empowered to remove students from class and refer behaviors for sanctioning to the Office of Student Accountability.