

HILC REAL BLIC - 188

DEPARTMENT OF AUDIO & VISUAL ARTS IONIAN UNIVERSITY

# **COURSE DESCRIPTION**

1. GENERAL			
SCHOOL	MUSIC AND AUDIOVISUAL ARTS		
DEPARTMENT	AUDIO AND VISUAL ARTS		
LEVEL	Undergraduate		
COURSE CODE	AUD821	SEMESTER	8 <sup>th</sup>
COURSE TITLE	Algorithmic Sound Structure and Composition		
INDEPENDENT TEACHING ACTIVITIES		WEEKLY TEACHING HOURS	ECTS
Lab Lecture		3	5
COURSE CATEGORY	Deepening Knowledge		
COURSE TYPE	Elective		
PREREQUISITES	-		
LANGUAGE OF TEACHING and EXAMINATIONS	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	YES (In English)		
URL	https://avarts.ionio.gr/en/studies/undergraduate/courses-descriptions/aud821/		
ECLASS	https://opencourses.ionio.gr/courses/DAVA181/		

## 2. TEACHING RESULTS

### **Teaching Results**

The objective of the class is to introduce students to the history and current practice of algorithmic creation of musical structures on the one hand and the principles of digital sound synthesis on the other. Regarding sound synthesis, students learn principles and genres of digital synthesis so that they can design their own sounds using various types of software and to understand the relationship between synthesis algorithms and the types of sounds which they genenerate. Regarding algorithmic composition, the objective is to teach both existing techniques or principles of algorithmic composition and to familiarize students with programming principles so that they can develop new methods and techniques of composition.

### **General Skills**

- Seek, analyze and synthesize data
- Autonomous work
- Team work
- Production of new research ideas
- Project design and management

### 3. CONTENT

The basic subject of this course is the presentation of techniques for the automatic composition of musical structures that can be realised by computer programmes. A review of algorithmic systems from Kircher and Schillinger to Schoenberg and the serialists, such as Messiaen and Xenakis, and other post-war composers is presented. Algorithmic techniques, ranging from those used in common music sequencer software to special experimental techniques based on fractals, I-systems, stochastic and genetic algorithms and cellular automata are examined. Examples of implementations of such algorithms are given using state-of-the-art software applications. As a practical exercise, students will prepare a musical composition using techniques taught during the course.

- 1st Week

Overview of the history of algorithmic composition and sound synthesis techniques

- 2nd Week



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**Courses' Descriptions** 

Introduction to sound synthesis techniques. Families of sound synthesis algorithms.

- 3rd Week

Abstract algebraic techniques of sound synthesis - noise, randomness and chaos, additive synthesis, subtractive synthesis, filters.

- 4th Week

Dample based synthesis. Wavetable synthesis, Granular synthesis techniques.

- 5th Week

Physical Modeling

- 6th Week

Spectra modeling techniques

- 7th Week

The event as basic structural element in composition. Event musical parameters and their physical counterparts.

- 8th Week

Generation of event sequences. Patterns and Streams.

- 9th Week

Scales and tunings

- 10th Week

Randomness, aleatoric techniques and generative algorithms.

- 11th Week

Use of (non musical) data collections as sources for musical composition.

- 12th Week

Uses of genetic algorithms and neural networks in the generation of musical structures and in sound syntheis.

- 13th Week

Review. Presentation of student projects.

### 4. TEACHING AND LEARNING METHODS - EVALUATION

TEACHING METHOD	Lectures	
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Enhanced by multimedia content. The learning process is supported by the asyncrhonous e- learning platform e-class.	
TEACHING STRUCTURE	ActivitySemester WorkloadLab Lectures39Literature Study and56Analysis70Practice and Preparation30Course Total (ECTS: 5)125	
EVALUATION OF STUDENTS		





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For the final examination, students are required to submit a written paper of ca 2500 words, treating one of the following topics:
<ul> <li>One category of sound synthesis techniques chosen from those taught during the course. Emphasis is placed on examples developed by the student.</li> <li>One category of algorithmic composition techniques selected from those taught during the course. Emphasis is place on examples developed by the student.</li> <li>Presentation of an original composition created by using techniques taught during the course.</li> </ul>
The paper must follow the guidelines for scientific writing published on the website of the Department. It must contain a list of references and follow the citation and reference standard Chicago15b, Author Date (https://web.l ibrary.uq.edu.au/files/26556/chicago15B-style-guide.pdf)
During the examination the student presents briefly their work and there is a short dialogue with the examiner. The student's contribution during classes in the form of questions or presentations is taken into account for the final evaluation.

### **5. BIBLIOGRAPHY**

Dean, R.T and McLean, A. 2018. The Oxford Handbook of Algorithmic Music. Oxford University Press.

Farnell, A. 2010. Designing Sound. MIT Press. Nierhaus, A. 2009. Algorithmic Composition. Springer.

Roads, C. 2001. Microsound. MIT Press.

Sigman, M. 2011. Steal This Sound. Keyboard Magazine. Tolonen, T., Välimäki, V., and Karjalainen, M. 1998. Evaluation of Modern Sound Synthesis Methods. HUT.