ERASMUS

HELLENIC MEDITERRANEAN UNIVERSITY

COURSE OUTLINES

Department of Music Technology and Acoustics

School of Music and Optoacoustic Technologies

Academic Year 2026-2027

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MULTIMEDIA TECHNOLOGY

COURSE OUTLINE

Responsible: Evangelos Kaselouris

1. GENERAL			
SCHOOL	School of Music and Optoacoustic Technologies		
ACADEMIC UNIT	Department of Music Technology and Acoustics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0807.1.005.0	**SEMESTER**	1st
COURSE TITLE	Multimedia Technology		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	4	6
Total	**4**	**6**

COURSE TYPE general background, special background, specialised general knowledge, skills development	Compulsory / Background
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Winter Semester
COURSE WEBSITE (URL)	

2. LEARNING OUTCOMES

Learning outcomes

Upon successful completion of the course, students will be able to:

- **Understand in depth** the nature of digital signals containing multimedia content.
- **Know the basic** data compression techniques.
- **Evaluate the quality** characteristics of multimedia content.
- **Produce and process** multimedia content.
- **Develop interactive** software applications using a scripting language.
- **Create hypertext pages** and embed multimedia content and interactive elements.

General Competences

The course aims to enable students to acquire the following general competences:

- **Search, analysis, and synthesis** of data and information, using the necessary technologies.
- **Adaptation** to new situations.
- **Autonomous** work.
- **Team** work.
- **Promotion of free,** creative, and inductive thinking.

3. SYLLABUS

A general introduction to the technologies of encoding, processing, and representation of multimedia content. More specifically, the course content includes:

- **Multimedia Content & Applications:** Types of multimedia content and general applications.
- **Digitization & Quality:** General information digitization techniques and quality characteristics.
- **Compression Principles:** General principles of compression (lossy or lossless, perceptual or statistical encoding).
- **Text:** Encodings, representations and annotations (e.g., XML), word processing and spreadsheets, hypertext and hypermedia.
- **Audio:** Capture, synthesis, encoding, compression, processing, and related software.
- **Image:** Capture, synthesis, encoding, compression, processing, and related software.
- **Video:** Capture, synthesis, encoding, compression, processing, and related software.
- **Animation:** Capture, synthesis, encoding, compression, processing, and related software.
- **Interactive Media:** Interactive multimedia and applications based on scripting languages.
- **Web Technologies:** Web-based multimedia applications and internet services.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	Use of open-source software, ICT (Information and Communication Technologies) in teaching, and in Laboratory Education. Use of a learning management system (e-class).
TEACHING METHODS The manner and methods of teaching are described in detail.	
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Final written examination, consisting of problem-solving and short-answer questions (70%). Weekly assignments, consisting of individual learning exercises (30%).

Activity	Semester workload
Lectures	26
Practice exercises	26
Independent Study	48
Projects	45
Exams	5
Course total	**150**

5. ATTACHED BIBLIOGRAPHY

Z. Li, M. Drew, J. Liu, Fundamentals of Multimedia, Springer, 2014.

V. Costello, Multimedia Foundations, Focal Press, 2012.

STRUCTURED PROGRAMMING

COURSE OUTLINE

Responsible: Maximos Kaliakatsos-Papakostas

1. GENERAL			
SCHOOL	School of Music and Optoacoustic Technologies		
ACADEMIC UNIT	Department of Music Technology and Acoustics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0807.2.004.1	**SEMESTER**	2nd
COURSE TITLE	Structured Programming		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	0	7
Total	**0**	**7**

COURSE TYPE general background, special background, specialised general knowledge, skills development	Background
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Spring Semester
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/SMOT115/

2. LEARNING OUTCOMES

Learning outcomes

The aim of the course is to introduce the design and development of computer programs based on the principles of structured programming. The course content is intended to familiarize students with the fundamental concepts of computer programming, provide an understanding of how computer programs are executed, and develop proficiency in the C programming language.

Upon successful completion of the course, students will be able to:

Develop programming skills and implement software using the C programming language.

Understand the fundamental principles of designing and implementing programs based on the structured programming paradigm.

Solve computational problems using computers.

Successfully undertake advanced courses in the curriculum that require computer programming knowledge and skills.

General Competences

The course aims to develop the following general competencies:

Ability to search for, analyze, and synthesize data and information using appropriate technologies.

Ability to adapt to new situations.

Ability to work independently.

Ability to work effectively as a member of a team.

Ability to foster free, creative, and inductive thinking.

3. SYLLABUS

Computer operation. Computer architecture and memory organization. Data flow within a computer system. Instruction execution.

Software development. Software engineering. Software project life cycle. The phases of analysis, design, testing, and maintenance.

Software and programming languages. Source code and executable programs. The programming environment. Program compilation, debugging, and execution.

Structured programming. The importance of program structure. Fundamental principles and techniques of structured programming.

Algorithms: general concepts. Stepwise algorithms. Flowcharts. Pseudocode. Algorithmic problem solving. Searching and sorting algorithms.

The C programming language: characteristics and capabilities. Structure of C programs. Functions in C. Mathematical functions in C. Introductory concepts.

Data representation: characters, integers, and floating-point numbers. Basic data types, constants, variables, and the assignment operator. Number systems.

Input/output functions.

Operators: arithmetic, relational, and bitwise operators. Boolean expressions, relational expressions, logical expressions, and operator precedence. Compound operators. Pointers and memory addresses.

Program flow control structures. Nested control structures.

Iterative control structures (loops). Nested loops.

Functions in C: definition, declaration, and invocation. Returning values from functions. Function types. Passing addresses to functions. Storage classes. Automatic, external, and static variables. Variable scope and lifetime. Recursive functions.

One-dimensional arrays: declaration, initialization, input, and output. Array processing techniques. Character strings. String manipulation. Multidimensional arrays. Pointers and arrays. Arrays as function arguments.

Enumerations, structures, and unions.

File handling. File access functions.

Functions for dynamic memory management.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	Eclass. Discussion Forum.
TEACHING METHODS The manner and methods of teaching are described in detail.	**Activity** | **Semester workload** **Course total** |

STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Intermediate exercises (50%), intermediate tests (30%), final project (20%).

5. ATTACHED BIBLIOGRAPHY

PROGRAMMING ENVIRONMENTS FOR SOUND & MUSIC

COURSE OUTLINE

Responsible: Panagiota Styliani Paschalidou

1. GENERAL			
SCHOOL	School of Music and Optoacoustic Technologies		
ACADEMIC UNIT	Department of Music Technology and Acoustics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0807.3.004.1	**SEMESTER**	1st
COURSE TITLE	Programming Environments for Sound & Music		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	0	7
Total	**0**	**7**

COURSE TYPE general background, special background, specialised general knowledge, skills development	Scientific area
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Winter Semester
COURSE WEBSITE (URL)	

2. LEARNING OUTCOMES

Learning outcomes

By completion of this course, students will be familiar with the theoretical background required for understanding basic sonic algorithmic processes and will have gained skills to develop their first computer music synthesis and sonic interaction algorithms in (mainly, but not exclusively) graphical audio programming environments.

General Competences

The course aims at getting students acquainted with audio programming environments and providing them with the basic understanding and skills of audio programming. This can be considered as an introductory course in digital audio synthesis, as it covers rudimentary knowledge on digital sound and computer music. No prior computer programming skills are required.

More specifically, the course offers fundamental knowledge on the following subjects:
- computer music
- digital sound
- digital sound synthesis
- GUIs and audio interactive systems.

3. SYLLABUS

Theory:

- Introduction to audio programming environments and languages (graphical/modular versus textual)
- Bridging analog to digital sound
- Digital sound: sampling & quantization
- The concepts of Oscillators, Unit Generators, Wavetables and Signal flowcharts
- Interpolation functions over time for sound control (amplitude envelopes, glissandi)
- Stereo imaging and panning
- Additive synthesis (example: Bell by Jean-Claude Risset)
- LFOs for tremolo and vibrato
- Real-time sound control and interaction (mouse and MIDI controllers)
- Overview and comparison of audio programming environments

Laboratory/hands-on:
The laboratory component demonstrates the implementation of sound synthesis and control techniques introduced in the lectures, using widely adopted music programming environments (MaxMsp/PureData/SuperCollider).

- Familiarization with the architecture of the selected programming environment.
- Creation of complex sounds using additive synthesis.
- Spatial positioning (panning) of the sound image within the stereo field.
- Implementation of tremolo and vibrato techniques.
- Design of a graphical user interface (GUI).
- Use of mapping functions for parameter control.

<table>
<tr><th colspan="2">4. TEACHING and LEARNING METHODS - EVALUATION</th></tr>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face (with other students or individually)</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Provision of multimedia learning materials; support of the learning process through the asynchronous distance-learning e-Class platform.</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Theory</td><td>2</td></tr>
<tr><td>Laboratory</td><td>2</td></tr>
<tr><td>Course total</td><td>4</td></tr>
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STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	The course is assessed as follows: **I. Midterm Assessment (MA) – 70% of the final grade** Development of a programming assignment in a sound and music programming environment during a laboratory session. **II. Final Assessment (FA) – 30% of the final grade** An individual theoretical assignment on a topic announced during the semester. Participation in both assessment components is mandatory. The final course grade is calculated as the weighted sum of the two components (MA ? 0.70 + FA ? 0.30) and must be at least **5.0** to pass the course. Active participation during class is also taken into consideration. The assessment criteria may be revised from one semester to another; however, they are made available to students through the course webpage and are announced at the beginning of the semester.

5. ATTACHED BIBLIOGRAPHY

- Books:

[1] Online course material and hand-outs ('E-class' online platform)

[2] Διαμαντόπουλος Τ., Η μουσική των υπολογιστών

[3] Λώτης Θ., Διαμαντόπουλος Τ., Μουσική πληροφορική και μουσική με υπολογιστές

[4] Roads C., The Computer Music Tutorial

[5] Dodge C., Jerse T., Computer Music: Synthesis, Composition, and Performance

[6] Collins N. & d'Escrivan J., The Cambridge Companion to Electronic Music

[7] Wilson S., Cottle D, Collins N., The Supercollider book

- Scientific journals:

[1] Computer Music Journal

[2] Leonardo

- Conferences:

[1] International Computer Music Conference (ICMC)

[2] Sound and Music Computing Conference (SMC)

[3] International Conference on New Interfaces for Musical Expression (NIME)

ELEMENTS OF MUSIC THEORY AND NOTATION

COURSE OUTLINE

Responsible: Antonios Botonakis

1. GENERAL			
SCHOOL	School of Music and Optoacoustic Technologies		
ACADEMIC UNIT	Department of Music Technology and Acoustics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0807.3.005.1	**SEMESTER**	1st
COURSE TITLE	Elements of Music Theory and Notation		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	0	6
Total	**0**	**6**

COURSE TYPE general background, special background, specialised general knowledge, skills development	Background
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Winter Semester
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/SMOT134/

2. LEARNING OUTCOMES

Learning outcomes

Upon successful completion of the course, students will be able to:

- Understand musical notation symbols
- Recognize the intervals of the equal-tempered musical system
- Recognize and understand the rhythmic flow of a musical work
- Understand musical scales
- Recognize and construct major and minor chords
- Use basic music notation software
- Recognize by ear and understand terminology related to musical expression, including dynamics, articulation, and fluctuations in tempo and rhythm

General Competences

The course aims to provide students with fundamental knowledge of music and musical notation, enabling them not only to read notes but also to utilize tools for score composition and creation.

Furthermore, the course aims to equip students with the following general competencies:

- Searching for, analyzing, and synthesizing data and information, including the use of necessary technologies
- Adapting to new situations
- Working independently

- Working in teams
- Promote free, creative, and inductive thinking

3. SYLLABUS

The aim of the course is to provide students—even those with no prior musical training—with the necessary knowledge regarding music theory and notation. The curriculum covers:

- Musical notes and intervals: identifying notes on the piano and the staff, aural recognition of intervals, and an introduction to musical range and the concept of musical clefs (Soprano, Alto, Tenor, Bass).
- Rhythm: introduction to musical note values ??(whole, half, quarter, eighth, sixteenth, thirty-second, sixty-fourth notes; dotted values) and their aural recognition. Time signatures—2/4, 3/4, 4/4 (concept of the measure; developing a sense of musical pulse and strong/weak beats; recognition of these time signatures); tempo; rhythmic dictation for practical rhythmic training.
- Dynamics: terminology regarding dynamics; musical examples for the practical understanding of dynamics (piano, forte, mezzo forte, etc.); articulation (staccato, legato, etc.).
- Formation of major and minor scales and their aural recognition (without covering every major and minor scale)
- Chords (major, minor) and basic harmonic structures: I-II-V and I-IV-V
- Introductory overview of instrument families and their recognition Aural training for the recognition of basic intervals and chords

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Learning management (e-class) • Proficiency in music notation and audio editing software (Finale, MuseScore, Sibelius, Audacity)
TEACHING METHODS The manner and methods of teaching are described in detail.	**Activity** | **Semester workload** **Course total** |
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Language of assessment: English. Written final examination involving problem-solving and short-answer questions (70%). Individual learning exercises (30%).

5. ATTACHED BIBLIOGRAPHY

Architektonides Vasiles, Theoria vasikon gnoseon tes mousikes mechri ten harmonia, Ekdoseis Ch. Nakas * K. Papagregoriou, 1987

Pyrgiotes Demetres, Mousike Theoria & Praktike, Ekdoseis Fagotto Books, 2000

Diamantes Giorgos, He Klasike theoria tes mousikes, Ekdoseis Nakas, 2013

Kampanas Georgios, Hoi vaseis tes theorias tes mousikes kai ton symvolon tes, Ekdoseis Gaitanou, 2007

Karakases Giorgos, Semeiographia kai analyse sto toniko mousiko systema, Ekdoseis Cambia , 2018

Lina Tonia, He theoria tes mousikes, Ekdoseis Ch. Nakas * K. Papagregoriou, 2018

Menakakes Demetres, Vasike Theoria tes Mousikes (Theoria A, *V, *G), Ekdoseis Ch. Nakas * K. Papagregoriou, 2011

Pyrgiotes Demetres, Askesiologio gia te mousike theoria kai praktike 1, Ekdoseis Fagotto Books, 2000

Instructor's teaching notes

SOUND ENGINEERING I

COURSE OUTLINE

Responsible: Spyridonas Polychronopoulos

1. GENERAL			
SCHOOL	School of Music and Optoacoustic Technologies		
ACADEMIC UNIT	Department of Music Technology and Acoustics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0807.4.003.1	**SEMESTER**	2nd
COURSE TITLE	Sound Engineering I		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	0	7
Total	**0**	**7**

COURSE TYPE general background, special background, specialised general knowledge, skills development	Scientific area
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	Ελληνικά / English
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Spring Semester
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/SMOT259/

2. LEARNING OUTCOMES

Learning outcomes

Στόχος του μαθήματος είναι η εκμάθηση σε θεωρητικό και πρακτικό / εργαστηριακό επίπεδο των γνώσεων που πρέπει να έχει ένας ηχολήπτης προοριζόμενος για τα δισκογραφικά Studios και για την κάλυψη Συναυλιών. Με την επιτυχή ολοκλήρωση του μαθήματος ο φοιτητής/τρια θα πρέπει:

- να γνωρίζει τη βασική ορολογία που σχετίζεται με τη δουλειά του ηχολήπτη
- να αντιλαμβάνεται τη χρησιμότητα του εξοπλισμού που χρησιμοποιείται στη μουσική παραγωγή και στην συναυλιακή κάλυψη
- να μπορεί να υλοποιήσει τυπικές συνδεσμολογίες και να επέμβει στη δρομολόγηση του σήματος σε κονσόλες του εμπορίου

in English:

The aim of the course is to provide students, at both theoretical and practical/laboratory levels, with the knowledge and skills required of a sound engineer working in recording studios and live concert production.

Upon successful completion of the course, students should be able to:

- Understand the basic terminology associated with sound engineering
- Understand the purpose and applications of the equipment used in music production and live sound reinforcement
- Set up standard audio connections and configure signal routing on commercially available mixing consoles

General Competences

Το μάθημα αποσκοπεί στο να αποκτήσει ο φοιτητής τις εξής γενικές ικανότητες

- Αναζήτηση, ανάλυση και σύνθεση δεδομένων και πληροφοριών, με τη χρήση και των απαραίτητων τεχνολογιών.
- Λήψη αποφάσεων
- Προσαρμογή σε νέες καταστάσεις
- Προαγωγή της ελεύθερης, δημιουργικής και επαγωγικής σκέψης

in English:

The course aims to equip students with the following general competences:

- Searching for, analysing and synthesising data and information using the appropriate technologies
- Decision-making
- Adapting to new situations
- Promoting free, creative and inductive thinking

3. SYLLABUS

- Ιστορική αναδρομή σχετικά με τις μεθόδους σύλληψης και αναπαραγωγή του ήχου
- Ανάλυση των βασικών χαρακτηριστικών της ακοής με έμφαση στην ιδιωτική αντίληψη
- Σχεδιαγραμματική παρουσίαση ενός στούντιο ηχογραφήσεων και περιγραφή του τρόπου λειτουργίας του
- Πολικές εξισώσεις και προδιαγραφές μικροφώνων
- Επιλογή τύπου μικροφώνου και τεχνικές τοποθέτησής του για λήψη του σήματος
- Συνδεσμολογίες κονσόλας με περιφερειακά ηχητικά συστήματα
- Δρομολόγηση του ήχου σε τυπικές κονσόλες

in English:

- Historical overview of sound recording and reproduction methods
- Analysis of the fundamental characteristics of hearing, with emphasis on auditory perception
- Schematic representation of a recording studio and description of its operation
- Microphone polar patterns and specifications
- Microphone selection and placement techniques for signal capture
- Connecting mixing consoles to peripheral audio equipment
- Audio signal routing in standard mixing consoles

4. TEACHING and LEARNING METHODS - EVALUATION	
DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	απόσταση (Learning Management System). Forum συζητήσεων.

TEACHING METHODS The manner and methods of teaching are described in detail.	

Activity	Semester workload
Διαλέξεις / Φροντιστήριο	26
Άσκηση	39
Non-directed study	30
Exams	5
Ατομική μελέτη	75
Course total	**175**

STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Assessment language: English / Greek; final oral examination and project assessment.

5. ATTACHED BIBLIOGRAPHY

[1] Δ. Δώδης, Ηχοληψία, Εκδόσεις Ίων, 2007. (ISBN: 978-960-411-071-1, Εύδοξος: 14616)

[2] Α. Παπαχρίστου, Περί Μουσικής και Ηχοληψίας, Εκδόσεις Νάκας, 2001. (ISBN: 960-290-562-X, Εύδοξος: 112031)

[3] Π. Σαπουντζής, Live Sound – Μιξάροντας θεωρία με πράξη, Εκδόσεις π3, 2015. (ISBN: 978-960-93-7299-2)

[4] Διδακτικές σημειώσεις του Δ. Ξενικάκη

in English:
[1] David Miles Huber, Emiliano Caballero & Robert Runstein — *Modern Recording Techniques: A Practical Guide to Modern Music Production*, 10th Edition, Focal Press, 2023.

[2] Francis Rumsey & Tim McCormick — *Sound and Recording: Applications and Theory*, 8th Edition, Routledge, 2021.

[3] Tim Dittmar — *Audio Engineering 101: A Beginner's Guide to Music Production*, 3rd Edition, Focal Press, 2025.

HISTORICAL ELEMENTS OF MUSIC AND ORGANOLOGY

COURSE OUTLINE

Responsible: Antonios Botonakis

1. GENERAL			
SCHOOL	School of Music and Optoacoustic Technologies		
ACADEMIC UNIT	Department of Music Technology and Acoustics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0807.4.004.1	**SEMESTER**	2nd
COURSE TITLE	Historical Elements of Music and Organology		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	0	5
Total	**0**	**5**

COURSE TYPE general background, special background, specialised general knowledge, skills development	Scientific area
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Spring Semester
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/SMOT146/

2. LEARNING OUTCOMES

Learning outcomes

Upon successful completion of the course, students will be able to:

- Understand the stages of development in the history of music
- Know the historical details regarding the lives and careers of major European and Greek composers
- Identify the historical period in which a given musical work was composed
- Distinguish musical instruments as they have evolved over the centuries
- Recognize the timbre of each musical instrument
- Identify the parts, components, and construction materials of musical instruments
- Understand the evolution of musical instruments within major musical cultures (Ancient Greek Music, Byzantine Music, European Music)

General Competences

The course aims to enable the student to acquire the following general competencies:

- Search for, analysis, and synthesis of data and information, including the use of necessary technologies
- Independent work
- Teamwork
- Creation of new educational ideas
- Respect for diversity and multiculturalism

- Promotion of free, creative, and inductive thinking

3. SYLLABUS

The aim of the course is to provide the necessary knowledge regarding the history of music and organology. The course content includes:

- A historical overview of key aspects of music (Ancient Greek, Byzantine, and European)
- Presentation and analysis of musical compositional motifs across the historical periods of European music
- A historical overview and the evolution of musical instruments
- Presentation of musical instruments and their categorization/classification based on the method of sound production
- Analysis of the key characteristics of musical instruments and presentation of related types
- Organological overview of the ensembles found in the Western orchestra and in Greek traditional music

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	Use of a learning management system (e-class).
TEACHING METHODS The manner and methods of teaching are described in detail.	**Activity** | **Semester workload** **Course total** |
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Language of assessment:English Written final examination consisting of short-answer and multiple-choice questions (100%).

5. ATTACHED BIBLIOGRAPHY

Averoph Ephe, Eisagoge sten Organognosia, Ekdoseis Philippos Nakas, 1992

J. Machlis – C. Forney, He apolause tes mousikes, Ekdoseis Nikos Thermos kai SIA IKE, 2014

Pol Gkriphiths, Monterna Mousike, Ekdoseis S.I. Zacharopoulos & SIA OE, 1993

Anogeianakes Phoivos, Hellenika Laika Mousika Organa, Ekdoseis Melissa, 1991 ou aiona, Ekdoseis Nephele, 1989

Saltsman Erik, Eisagoge ste mousike tou 20ou aiona, Ekdoseis Nephele, 1989

Michaelides Solon, Enkyklopaideia tes Archaias Hellenikes mousikes, Ekdoseis tou Morphotikou Hidrymatos tes Ethnikes Trapezes, 2003

Michels Ulrich, Atlas tes Mousikes *, Ekdoseis Ph. Nakas, 1994

Michels Ulrich, Atlas tes Mousikes *I, Ekdoseis Ph. Nakas, 1995 [9] Tatses Telemachos, Organognosia, Ekdoseis K. Papagregoriou * Ch. Nakas, 1986

Headington Christopher, Historia tes Dytikes Mousikes I, Ekdoseis Gutenberg, 1997

Headington Christopher, Historia tes Dytikes Mousikes *I, Ekdoseis Gutenberg, 1998

Chourmouzios Chartophylax, Eisgoge eis to theoretikon kai praktikon tes ekklesiastikes , Historia tes Dytikes mousikes, Ekdoseis University Studio Press, 2007

ELECTROACOUSTICS LABORATORY

COURSE OUTLINE

Responsible: Nikos Stefanakis

1. GENERAL			
SCHOOL	School of Music and Optoacoustic Technologies		
ACADEMIC UNIT	Department of Music Technology and Acoustics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0807.4.005.2	**SEMESTER**	2nd
COURSE TITLE	Electroacoustics Laboratory		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	2	4
Total	**2**	**4**

COURSE TYPE general background, special background, specialised general knowledge, skills development	Scientific area
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	Greek
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Spring Semester
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/SMOT178/

2. LEARNING OUTCOMES

Learning outcomes

The course is delivered through a series of independent laboratory exercises, providing students with hands-on experience in the operation of audio systems as well as in performing fundamental electroacoustic measurements.

Upon successful completion of the course, students will be able to:

- use a signal generator and an oscilloscope to perform laboratory measurements;
- understand the nature and characteristics of different types of audio signals and ensure their safe, reliable, and high-quality interconnection and transmission;
- understand the methods used for conducting fundamental electroacoustic measurements and perform these measurements in a laboratory environment;
- evaluate the quality and suitability of audio devices and systems based on their technical specifications.

General Competences

The course aims to develop the following general competencies:

- the ability to search for, analyze, and synthesize data and information using appropriate technologies;
- the ability to adapt to new situations;
- the ability to work independently;
- the ability to work effectively as part of a team.

3. SYLLABUS

- Frequency response of audio devices and systems
- Microphone polar patterns
- Passive frequency filters
- Room equalization using a graphic equalizer
- Loudspeaker directivity pattern
- Measurement of crosstalk in multichannel audio devices
- Study of balanced audio signals and direct injection (DI)
- Sound reinforcement systems
- Measurement of acoustic source separation

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	in person
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	eclass excel word
TEACHING METHODS The manner and methods of teaching are described in detail.	**Activity** / **Semester workload** Laboratory excercizes / 26 **Course total** / **26**
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Assessment of laboratory reports - 40% Written exam - 60%

5. ATTACHED BIBLIOGRAPHY

Davis, Gary, and Gary D. Davis. *The sound reinforcement handbook*. Hal Leonard Corporation, 1989.

SOUND DESIGN

COURSE OUTLINE

Responsible: Aikaterini Tzedaki

1. GENERAL			
SCHOOL	School of Music and Optoacoustic Technologies		
ACADEMIC UNIT	Department of Music Technology and Acoustics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0807.5.003.1	**SEMESTER**	1st
COURSE TITLE	Sound Design		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	0	6
Total	**0**	**6**

COURSE TYPE general background, special background, specialised general knowledge, skills development	Skills Development
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Winter Semester
COURSE WEBSITE (URL)	

2. LEARNING OUTCOMES

Learning outcomes

The aim of this course is to introduce the students to the theory, practice and applications of sound design. Sound design art applies in film, theatre, radio, interactive environments, web applications, multimedia and educational tools, and generally wherever there is the necessity to design what will be heard in a specific place and time.

General Competences

The course aims to acquire the following general competencies: a) Search, analysis and synthesis of data and information, using the necessary technologies. b) Decision making. c) Autonomous work. d) Design and management of projects. e) Exercise of criticism & self-criticism f) Promotion of free, creative and inductive thinking g) Production of original artistic creation

3. SYLLABUS

This course aims at getting to get to know, familiarize and practice students with Sound Design. The thematic modules of the course include:

- Basic concepts and terminology in the arts of sound.
- Sound arts and the music of sounds.
- Areas of application of sound design.

- Basic techniques of transforming sounds by mechanical, analogue and digital means.
- Methodologies for collecting, classifying and categorizing audio material.
- Analysis of selected music and audiovisual artworks.
- Analysis of given script/scenario in sound categories.
- Sound dramaturgy.
- Functional categories of sound and music in their coexistence with action and moving pictures. (theatre, cinema, video, etc.)
- Creating stand-alone sound compositions (music with sounds).
- Individual assignment for the creation either of an original sound composition or sound design for moving image.

4. TEACHING and LEARNING METHODS - EVALUATION	
DELIVERY Face-to-face, Distance learning, etc.	in person
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	e-class
TEACHING METHODS The manner and methods of teaching are described in detail.	**Activity** | **Semester workload** **Course total** |
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Evaluation language: English 1. Written final exam with Short Answer Questions (30%). 2. Elaboration of one (1) small-scale theoretical study or one (1) short duration of sound creation (20%) in the middle of the semester (progress). 3. 3. Artistic creation (musical composition with sounds either a) independently or b) as sound design of a text, history or short video) (50%)

5. ATTACHED BIBLIOGRAPHY

[1] Supervisor notes

[2] M. Chion, Audio-Vision: Sound on Screen, Columbia University Press, 1994

[3] J.L. Drever, 'Soundscape Composition: The Convergence of Ethnography and Acousmatic Music', Organised Sound, 7(1), pp. 21-27, 2002.

[4] EARS site. The ElectroAcoustic Resource Site (EARS), http://www.ears.dmu. ac.uk/.

[5] S. Emmerson 'The Relation of Language to Materials' in Emmerson, S. (ed.), The Language of Electroacoustic Music, pp. 67-78, Basingstoke: Macmillan, 1986

[6] L. Landy, Understanding the Art of Sound Organization, Cambridge, Mass.: MIT Press, 2007.

[7] A. Licht, Sound Art- Beyond Music, Between Categories, New York: Rizzoli, 2007

[8] D. Sonnenschein, Sound design: The expressive power of music, voice, and sound effects in cinema. Michael Wiese Productions, 2001

SOUND ENGINEERING II

COURSE OUTLINE

Responsible: Dimosthenis Makris

1. GENERAL			
SCHOOL	School of Music and Optoacoustic Technologies		
ACADEMIC UNIT	Department of Music Technology and Acoustics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0807.5.005.1	**SEMESTER**	1st
COURSE TITLE	Sound Engineering II		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	5	7
Total	**5**	**7**

COURSE TYPE general background, special background, specialised general knowledge, skills development	Skills Development, Scientific Area
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Winter Semester
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/SMOT258/

2. LEARNING OUTCOMES

Learning outcomes

The aim of the course is to provide students with the theoretical knowledge and practical skills required for advanced sound recording in professional studio and live performance environments. The course focuses on the planning, technical setup, and execution of recording sessions, including equipment selection, microphone placement, signal routing, mixing console operation, monitoring, multitrack recording, and technical troubleshooting.

Students will develop practical experience in recording individual instruments, vocalists, ensembles, and live performances. Particular emphasis will be placed on achieving high-quality sound capture, selecting appropriate recording techniques, maintaining a clean and reliable signal path, and adapting the recording setup to different musical, technical, and acoustic requirements.

As part of the coursework, students will plan and carry out the recording of a musical performance. They will be expected to organise the session, select and position the necessary equipment, configure the recording system, and deliver a technically coherent stereo version of the recorded material for evaluation. Upon successful completion of the course, students will be able to:

- plan and prepare recording sessions in studio and live performance environments;
- select suitable microphones, recording equipment, and technical configurations for different sound sources;
- apply mono, stereo, and multichannel microphone techniques;
- configure and operate analogue or digital mixing consoles for recording purposes;

- establish appropriate signal routing between microphones, preamplifiers, consoles, audio interfaces, monitoring systems, and recording software;
- apply correct gain staging and recording-level practices;
- assess the acoustic and technical requirements of different recording spaces;
- operate multitrack recording systems and organise recorded material effectively;
- identify and resolve common problems related to noise, distortion, phase, connectivity, monitoring, and signal flow;
- evaluate the technical and perceptual quality of a recording and prepare the recorded material for subsequent production stages.

General Competences

The course aims to support the development of the following general competences:

- searching for, analysing, and synthesising data and information through the use of appropriate technologies;
- making informed technical and creative decisions;
- working effectively as part of a team;
- adapting to new situations, working environments, and technical requirements;
- developing independent, creative, and critical thinking.

3. SYLLABUS

- Planning and technical preparation of studio and live recording sessions.
- Signal flow, gain staging, routing, monitoring, and mixing-console operation.
- Microphone selection and placement for voices, instruments, ensembles, and live performances.
- Stereo recording techniques: theoretical principles, comparative analysis, phase relationships, stereo image, and mono compatibility.
- Equalisation and dynamics processing: operating principles and practical guidelines for use during recording.
- Spatial effects: basic principles and appropriate use in recording and monitoring environments.
- Multitrack and multichannel recording, including session organisation, documentation, and preparation of recorded material for stereo or surround reproduction.
- Development of efficient working methods and evaluation of alternative recording approaches.
- Technical planning of sound systems for concerts, including system requirements, signal distribution, stage setup, monitoring, and live multitrack recording.
- Assessment of the acoustic characteristics of studios and performance spaces in relation to microphone placement, recording requirements, and sound-system design.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	E-class
TEACHING METHODS The manner and methods of teaching are described in detail.	**Activity** | **Semester workload** **Course total** |

STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Intermediate (30%) and Final (70%) project.

5. ATTACHED BIBLIOGRAPHY

[1] Davis, G. and Jones, R., *The Sound Reinforcement Handbook*, Yamaha Corporation, 1988. ISBN: 978-0881889000.

[2] Huber, D. M., Caballero, E. and Runstein, R., *Modern Recording Techniques: A Practical Guide to Modern Music Production*, 10th ed., Focal Press, 2024.

[3] Corbett, I., *Mic It! Microphones, Microphone Techniques, and Their Impact on the Final Mix*, 2nd ed., Routledge, 2021.

[4] McCarthy, B., *Sound Systems: Design and Optimization: Modern Techniques and Tools for Sound System Design and Alignment*, 3rd ed., Routledge, 2016.

[5] Course notes prepared by D. Xenikakis and supplementary educational material provided by the instructor.

AUDIO SOFTWARE DEVELOPMENT

COURSE OUTLINE

Responsible: Maximos Kaliakatsos-Papakostas

1. GENERAL			
SCHOOL	School of Music and Optoacoustic Technologies		
ACADEMIC UNIT	Department of Music Technology and Acoustics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0807.5.006.1	**SEMESTER**	1st
COURSE TITLE	Audio Software Development		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	0	7
Total	**0**	**7**

COURSE TYPE general background, special background, specialised general knowledge, skills development	
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Winter Semester
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/SMOT160/

2. LEARNING OUTCOMES

Learning outcomes

The aim of the course is to provide a solid foundation in digital signal processing and the development of audio applications, with an emphasis on applications that require real-time processing.

Upon successful completion of the course, students will be able to:

Understand the fundamental components involved in the development of audio applications.

Understand the programming practices required to access and configure audio hardware (e.g., number of channels, block size, sampling rate, etc.).

Be familiar with the programming tools and platforms used for the acquisition, analysis, synthesis, playback, and processing of digital audio signals.

Adapt digital signal processing methods to audio applications that require real-time processing.

Develop audio applications for desktop and mobile computing platforms.

General Competences

The course aims to develop the following general competencies:

Ability to search for, analyze, and synthesize data and information using appropriate technologies.

Ability to adapt to new situations.

Ability to work independently.

Ability to work effectively as a member of a team.

Ability to promote free, creative, and inductive thinking.

3. SYLLABUS
Theory
Python
Variables
Lists, dictionaries, sets, and tuples
Functions and classes
Memory management
Audio files and digital audio encoding
Real-time audio
C++
Variables, functions, and classes
Pointers and vectors
Vector processing using functions
The JUCE framework
Programming audio effects in C++
Developing real-time audio applications with JUCE
Laboratory Exercises
Python
Variables and dictionaries
Programming static sound generators
Functions, classes, and sound generators
Memory management and audio encoding
Implementing simple effects for real-time audio processing
C++
Variables, functions, and classes
Vector operations using pointers
Implementing a distortion effect
Implementing sound generators with real-time parameter control
Implementing a delay effect
Implementing a tremolo effect
Implementing a chorus effect

4. TEACHING and LEARNING METHODS - EVALUATION	
DELIVERY Face-to-face, Distance learning, etc.	On-site

<table>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Google colab, eclass, JUCE, Microsoft Visual Studio Community Edition</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.</td><td><table><tr><td>Activity</td><td>Semester workload</td></tr><tr><td>Course total</td><td></td></tr></table></td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure</td><td>Intermediate and final exercises.</td></tr>
</table>

5. ATTACHED BIBLIOGRAPHY

DIGITAL MUSIC REPRESENTATIONS

COURSE OUTLINE

Responsible: Chrysoula Alexandraki

1. GENERAL			
SCHOOL	School of Music and Optoacoustic Technologies		
ACADEMIC UNIT	Department of Music Technology and Acoustics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0807.6.001.1	**SEMESTER**	2nd
COURSE TITLE	Digital music representations		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	0	6
Total	**0**	**6**

COURSE TYPE general background, special background, specialised general knowledge, skills development	Scientific area
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Spring Semester
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/SMOT165/

2. LEARNING OUTCOMES

Learning outcomes

The aim of the course is to provide the necessary knowledge for understanding the particularities involved in the management, storage, and processing of semantic information in music.

Upon successful completion of the course, students will be able to:

- Understand the use of such data and its application in systems for the recognition, classification, and retrieval of digital files
- Produce and process alternative forms of description of musical information based on standards such as MIDI or MusicXML
- Produce musical annotations by encoding temporally evolving musical information into a digital audio signal
- Explore and enrich large sets of musical data (music datasets, music corpora)

General Competences

The course aims to help students acquire the following general competencies:

- Searching for, analyzing, and synthesizing data and information, using the necessary technologies
- Adapting to new situations
- Working autonomously
- Working in teams
- Working in an interdisciplinary environment

- Promoting free, creative, and inductive thinking

3. SYLLABUS

The subject of the course "Digital Representations of Music" concerns any type of descriptive information that can be associated with music. Such information includes, for example, metadata describing a musical work as a whole, as well as the description of its content in terms of notes, rhythmic values, and musical instruments.

The syllabus presents technologies related to issues such as:

- Music metadata
- Music notation file formats (score formats)
- Score rendering tools
- Software tools and programming libraries for the composition and processing of symbolic music notation (music APIs)

As indicative examples, the course presents standards such as: ID3, MIDI, MusicXML, MEI, Kern and Humdrum, Music21, and MusicBrainz. Emphasis is placed on the encoding of control commands for digital musical instruments and files using the MIDI protocol.

The practical exercises include reading, creating, and editing MIDI files with the Mido package (MIDI Objects for Python).

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	Programming in Python, Use of open-source software, Laboratory Education. Use of a learning management system (e-class).
TEACHING METHODS The manner and methods of teaching are described in detail.	
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Written final examination, involving problem-solving and short-answer questions (60%). 2-3 progress examinations during the semester, held in a computer lab (40%).

Activity	**Semester workload**
Lectures	26
Practice Exercises	26
Study and literature review	48
Εξέτασεις - Πρόοδοι	50
Course total	**150**

5. ATTACHED BIBLIOGRAPHY

1. Ε. Νίκα-Σαμψών, Εισαγωγή στην μουσικολογία και τις μουσικές επισήμες, University Studio Press, 2019. [2] Χ. Αλεξανδράκη και Χ. Χουσίδης, Πρωτόκολλα Μουσικής Επικοινωνίας, Διδακτικές Σημειώσεις, Εγχειρίδιο Διδάσκοντος, 2011

Γενικά δεν υπάρχει ελληνικό συγγραμμα που να καλύπτει την ύλη του μαθήματος. Χρησιμοποιούνται οι σημειώσεις διδάσκοντος καθώς και διάφορες διαδικτυακές πηγές που αναφέρονται στη διδασκόμενη ύλη.

Σημείώσεις διδάσκοντος.

1. Αλεξανδράκη (2011), Πρωτόκολλα Μουσικής Επικοινωνίας

2. Αλεξανδράκη (2024), Δημιουργία, επεξεργασία κι απόδοση ψηφιακών αναπαραστάσεων της μουσικής με προγραμματιστικά εργαλεία της Python

ELECTRONIC MUSICAL INSTRUMENTS

COURSE OUTLINE

Responsible: Aikaterini Tzedaki

1. GENERAL			
SCHOOL	School of Music and Optoacoustic Technologies		
ACADEMIC UNIT	Department of Music Technology and Acoustics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0807.6.007.1	**SEMESTER**	2nd
COURSE TITLE	Electronic Musical Instruments		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	0	6
Total	**0**	**6**

COURSE TYPE general background, special background, specialised general knowledge, skills development	Επιστημονικής Περιοχής, Ανάπτυξης Δεξιοτήτων
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Spring Semester
COURSE WEBSITE (URL)	

2. LEARNING OUTCOMES

Learning outcomes

The aim of the course is to introduce on the issues of the structure, operation, design and practice of electronic musical instruments and interactive musical systems used for music performance. Upon successful completion of the course, the student will be able to: - Analyse the structure and operation of electronic musical instruments. - To design original new musical instruments. - To experiment with the alternative methods of production & control of sound in music practice either in a group or individually.

General Competences

The course aims to acquire the following general abilities: Search, analysis and synthesis of data and information, using the necessary technologies. Adapting to new situations. Autonomous work. Group work. Work in an interdisciplinary environment. Production of new research ideas. Promotion of free, creative and inductive thinking

3. SYLLABUS

This course aims at acquaintance and familiarization of students with topics related to the structure, operation, design and practice of electronic musical instruments. The thematic sections of the course include: 1) Electronic Musical Instruments: Types, Function, Historical References. 2) Early electronic musical instruments - Composers – Computer use 3) Musical instruments as interactive systems – Parts of the musical instrument. 4) Comparison of acoustic and electronic musical instruments. 5) Generalized model of a musical instrument. 6)

Audio design of alternative electronic and hybrid musical instruments 7) Live electronics-History and practices 8) The design and evaluation of electronic musical instruments 9) Exercise of designing an electronic musical instrument for more than two musicians. 10) Selected presentations of the current developments of the field - Examples. - Research methodology, institutions, research organizations, relevant international conferences and journals. – Selection of sources. 11) Personal student work.

4. TEACHING and LEARNING METHODS - EVALUATION	
DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	e-class
TEACHING METHODS The manner and methods of teaching are described in detail.	**Activity** | **Semester workload** **Course total** |
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Evaluation language: English 1. Oral examination (30%). 2. Participation in the design exercises (30%) 3. Individual (or in a small group -up to 3 people) design project of exemplary new electronic instrument (40%).

5. ATTACHED BIBLIOGRAPHY

[1] Σημειώσεις Διδάσκοντος [2] P.R. Cook (ed.), Music, Cognition, and Computerized Sound – An Introduction to Psychoacoustics, The MIT Press, 1999. [3] Davis Hugh, Electronic Musical Instruments, New Grove Dictionary of Music, Macmillan Publishers Ltd, 1998-2002. [4] J. Eaton, “This is an Instrument" in Contemporary Music Review, Vol. 18 Part 3, 1999. [5] S. Emmerson, “Live' versus 'real-time”, Contemporary Music Review, 10(2), pp. 95-101, 1994. [6] J. Pressing, Jeff, “Cybernetic Issues in Interactive Performance Systems”, Computer Music Journal, Vol. 14 – 1, MIT Press, pp. 12-15, 1990. [7] C. Roads, The computer Music Tutorial, Massachusetts Institute of Technology, 1996. [8] L. Theremin, "Recollections", Contemporary Music Review, Vol. 18, Part 3, 1999.

ACOUSTIC ECOLOGY AND SOUND ARTS

COURSE OUTLINE

Responsible: Aikaterini Tzedaki

1. GENERAL			
SCHOOL	School of Music and Optoacoustic Technologies		
ACADEMIC UNIT	Department of Music Technology and Acoustics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0807.7.012.1	**SEMESTER**	1st
COURSE TITLE	Acoustic Ecology and Sound Arts		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	0	6
Total	**0**	**6**

COURSE TYPE general background, special background, specialised general knowledge, skills development	Εμβάθυνσης Γνώσεων
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Winter Semester
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/SMOT129/

2. LEARNING OUTCOMES

Learning outcomes

The aim of the course is to introduce the Theory and Practices of Acoustic Ecology and their application to Sound Arts.

• Understand and use the specialized terminology of Acoustic Ecology in issues related to Sound.

• To learn and apply the research methodologies of the field (sound maps, categorization of sound sources and events, interpretation of the sounds of the environment as a means of acoustic communication etc) to the study and analysis of the sound environment.

• Create sound environments and/ or musical soundscape compositions.

General Competences

The course aims to acquire the following general competencies: a) Search, analysis and synthesis of data and information, using the necessary technologies. b) Decision making. c) Autonomous work. d) Design and management of projects. e) Exercise of criticism & self-criticism f) Promotion of free, creative and inductive thinking g) Production of original artistic creation

3. SYLLABUS

- What is Acoustic Ecology? – Basic Terminology.
- Historical retrospection and evolution of Acoustic Ecology.

- Acoustic Communication, Soundscape research methodologies
- Acoustic Ecology in the sound arts. – Soundscape music.
- Soundwalking and field work practices- an introduction
- Soundscape Analysis I – indicative audio recordings, audio map and audio calendar.
- Soundscape Analysis II– methodology for recording data and drawing conclusions.
- Field exercise: Design of audio map and audio calendar.
- Field exercise: Audio recording
- Field Exercise: Soundwalk
- Composition of soundscape music.
- Listening and Analysing Sessions (3) selected relevant sound arts works

<table>
<tr><th colspan="2">4. TEACHING and LEARNING METHODS - EVALUATION</th></tr>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Πρόσωπο με πρόσωπο.</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>eclass</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.</td><td><table><tr><th>Activity</th><th>Semester workload</th></tr><tr><td>Course total</td><td></td></tr></table></td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure</td><td>I. Written Paper and Public presentation: - Soundscape Analysis of a chosen area using methodologies presented in the course- participation rate in the final score of 50%
II. Soundscape composition:- Original sound art work based on the findings, ideas and sound recordings of the specific area of the first assignment. participation rate in the final score of 50%</td></tr>
</table>

5. ATTACHED BIBLIOGRAPHY

• Blesser, B. and Salter, L.R. (2007), Spaces Speak, Are You Listening?, Cambridge, Mass.: MIT Press.

• Kelman, A.Y. (2010), 'Rethinking the Soundscape-A Critical Genealogy of a Key Term in Soundscape Studies ', Senses & Society, 5(2), pp. 212-234, London: Berg.

• Krause, B. (2002), Wild Soundscapes – Discovering the Voice of the Natural World, Berkeley: Wilderness Press.

• Lopez, F. (2004), 'Profound Listening and Environment Sound Matter', In Cox, Ch., Warner, D., (eds.), Audio Culture: Readings in modern music, pp. 82–87, New York: Continuum.

• Oliveros, P. (2005), Deep Listening - A Composer's Sound Practice, iUniverse, Inc, USA.

• Schafer, R.M. (2006), 'The Music of the Environment', in Cox, Ch. and Warner, D., (eds.), Audio Culture: Readings in modern music, pp. 29-39, New York: Continuum.

• Smalley, D. (2007), 'Space-form and the acousmatic image', Organised Sound, 12(1), pp. 35-58.

AUDIO OVER COMPUTER NETWORKS

COURSE OUTLINE

Responsible: Chrysoula Alexandraki

1. GENERAL			
SCHOOL	School of Music and Optoacoustic Technologies		
ACADEMIC UNIT	Department of Music Technology and Acoustics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0807.8.001.1	**SEMESTER**	2nd
COURSE TITLE	Audio over Computer Networks		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	0	6
Total	**0**	**6**

COURSE TYPE general background, special background, specialised general knowledge, skills development	Επιστημονικής Περιοχής, Εμβάθυνσης Γνώσεων
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Spring Semester
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/SMOT210/

2. LEARNING OUTCOMES

Learning outcomes

Upon successful completion of the course, students will be able to:

- Understand how computer networks function and are organized, and the use of applications over such networks
- Develop web applications that utilize audio data
- Understand the basic requirements of Networked Music Performance (NMP) systems
- Design and assemble a basic system for audio communication over a network
- Configure the parameters of audio communication systems according to the requirements of the use-case scenario

General Competences

The course aims to help students acquire the following general competencies:

- Searching for, analyzing, and synthesizing data and information, using the necessary technologies
- Decision-making
- Project design and management
- Working autonomously and working in teams
- Promoting free, creative, and inductive thinking

3. SYLLABUS

This course covers fundamental knowledge in computer networking technology and focuses on techniques for audio signal transmission, particularly in web audio applications. Specifically, its content includes:

- Introduction to computer networks and the services they provide
- Layered network architecture (OSI Model)
- Distributed networks and network topologies
- Network nodes (routers, repeaters, bridges, firewalls, etc.)
- Internet protocols (TCP/IP Suite)
- Structure of network packets
- Routing, switching, multiplexing
- Network reliability and quality characteristics (bandwidth, transmission time, packet loss)
- Specifications of a Networked Music Performance system
- Current Networked Music Performance systems
- Encoding of audio signals for transmission
- Packet recovery techniques for reliable delivery
- Acoustic echo cancellation techniques
- Exercises in assembling a Networked Music Performance system
- Network simulation exercises
- Packet routing monitoring exercises

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	Programming using open-source software and Application Programming Interfaces, Learning Management System (e-class)
TEACHING METHODS The manner and methods of teaching are described in detail.	
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Written final examination, involving problem-solving and short-answer questions (60%). Group project (of at most 2-3 people) involving learning exercises (40%).

Activity	**Semester workload**
Lectures	26
Practice Exercises	26
Independent study	50
Ανάλυση Βιβλιογραφίας	38
Εξέταση - Εργασία	10
Course total	**150**

5. ATTACHED BIBLIOGRAPHY

1. Tanenbaum Andrew, Δίκτυα Υπολογιστών, 4η Έκδοση, ΕΚΔΟΣΕΙΣ ΚΛΕΙΔΑΡΙΘΜΟΣ ΕΠΕ, 2011, η5 έκδοση
2. Kurose, Ross, Computer Networking, A Top-Down Approach 6th Edition
3. Gabrielli Leonardo, Squartini Stefano, Wireless Networked Music Performance, Springer Briefs in Electrical and Computer Engineering, 2016
4. Ciccarelli Faulkner, Δίκτυα Υπολογιστών Εισαγωγή στη Σύγχρονη Τεχνολογία, , Εκδόσεις Μ. Γκιούρδας, 2005

5. Rottondi, C., Chafe, C., Allocchio, C., & Sarti, A. (2016). An overview on networked music performance technologies. IEEE Access, 4, 8823–8843. https://doi.org/10.1109/ACCESS.2016.2628440
6. Alexandraki C. & Akoumianakis D. (2010): Exploring New Perspectives in Network Music Performance: The DIAMOUSES Framework, Computer Music Journal, 34(2): 66-83

APPLIED MACHINE LEARNING

COURSE OUTLINE

Responsible: Maximos Kaliakatsos-Papakostas

1. GENERAL			
SCHOOL	School of Music and Optoacoustic Technologies		
ACADEMIC UNIT	Department of Music Technology and Acoustics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0807.8.004.1	**SEMESTER**	2nd
COURSE TITLE	Applied Machine Learning		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	0	6
Total	**0**	**6**

COURSE TYPE general background, special background, specialised general knowledge, skills development	
PREREQUISITE COURSES	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS	English
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Spring Semester
COURSE WEBSITE (URL)	https://eclass.hmu.gr/courses/SMOT225/

2. LEARNING OUTCOMES

Learning outcomes

Machine learning has become a fundamental component of numerous commercial and research applications. Using the Python programming language and libraries such as PyTorch, it is possible to rapidly develop sophisticated applications in areas including audio-based human–computer interaction (e.g., natural language dialogue systems), music information retrieval, and many others.

With this in mind, the course aims to introduce students to the field of machine learning. Within this framework, students will study the principles underlying the various stages involved in implementing data-driven knowledge discovery systems, using both classical machine learning techniques and state-of-the-art methods. The course also covers the latest approaches to natural language interaction based on large language models. Lectures will address the complete machine learning workflow, including data collection, feature extraction, model training, and performance evaluation.

In addition to providing the necessary theoretical background, the course makes extensive use of Python libraries that are widely employed in both research and commercial applications for the development of automatic pattern recognition systems in domains such as natural language processing, audio signal processing, and related fields.

General Competences

Upon successful completion of the course, students will be able to:

Understand the fundamental concepts and applications of machine learning.

Evaluate the advantages and limitations of widely used machine learning algorithms.

Design datasets and construct reliable training and evaluation sets for data-driven knowledge discovery.

Apply advanced model evaluation techniques and hyperparameter optimization methods.

Demonstrate proficiency in the use of popular Python-based machine learning libraries and frameworks.

Employ trained large language models to develop natural language human–computer interaction systems.

3. SYLLABUS

The following topics will be covered in the Applied Machine Learning course.

Theory

Introduction to machine learning: linear regression and logistic classification

Handwritten digit classification from images: introduction to neural networks

Convolutional neural networks for image and audio processing; transposed (deconvolutional) neural networks

Autoencoders, Variational Autoencoders (VAEs), and Generative Adversarial Networks (GANs)

Semantic embedding methods for time-series data

Time-series modeling and processing using Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) networks

Transformers and Large Language Models (LLMs)

Large Language Models for tool use, Retrieval-Augmented Generation (RAG), and Agentic AI

Laboratory Exercises

Forward propagation in neural networks

Handwritten digit classification

Convolutional neural networks for image and audio processing

Variational Autoencoders for audio applications

Semantic word embedding exercises for natural language

Using LSTM networks for music emotion recognition

Using Large Language Models for natural language interaction

Using Large Language Models and external tools for music analysis

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	Google colab, eclass
TEACHING METHODS The manner and methods of teaching are described in detail.	**Activity** | **Semester workload** **Course total** |
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	Intermediate exercises and final project.

5. ATTACHED BIBLIOGRAPHY

[1] C. M. Bishop, Αναγνώριση Προτύπων και Μηχανική Μάθηση, ΕΚΔ. Γρηγόριος Χρυσοστόμου Φούντας, 2019 (ISBN 9789603307907 – Κωδικός στο Εύδοξο: 86053413)

[2] J. Grus, Επιστήμη Δεδομένων: Βασικές Αρχές και Εφαρμογές με Python, 2η έκδοση, ΕΚΔ. Α. ΠΑΠΑΣΩΤΗΡΙΟΥ & ΣΙΑ Ι.Κ.Ε., 2020 (ISBN: 978-960-491-144-8 - Κωδικός στον Εύδοξο: 94690736)

[3] A. Geiron, Hands-on machine learning with Scikit-Learn, Keras and TensorFlow: concepts, tools, and techniques to build intelligent systems (2nd ed.). O'Reilly. 2019

[4] D. Foster, Generative deep learning: Teaching machines to paint, write, compose, and play. O'Reilly Media Company.

[5] Ian H. Witten; Eibe Frank; Mark A. Hall, Data Mining: Practical machine learning tools and techniques, 3rd Edition, Morgan Kaufmann, San Francisco. 2011.

[6] D. MacKay, Information Theory, Inference, and Learning Algorithms, Cambridge University Press, 2003.

[7] T. Mitchell, Machine Learning, McGraw Hill, 1997

[8] S. Guido and A. Muller, Introduction to Machine Learning with Python, O'Reilly Media, 2016.

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