UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze Umanistiche
ACADEMIC YEAR	2016/2017
MASTER'S DEGREE (MSC)	MUSICOLOGY AND PERFORMANCE STUDIES
SUBJECT	MUSIC COMPUTER SCIENCE - ADVANCED COURSE
TYPE OF EDUCATIONAL ACTIVITY	C
AMBIT	20997-Attività formative affini o integrative
CODE	18404
SCIENTIFIC SECTOR(S)	ING-INF/05
HEAD PROFESSOR(S)	CHELLA ANTONIO Professore Ordinario Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	120
COURSE ACTIVITY (Hrs)	30
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**CHELLA ANTONIO** Monday 09:00 11:00 DICGIM, edificio 6, III piano

DOCENTE: Prof. ANTONIO CHELLA

PREREQUISITES	No prerequisites are mandatory. A basic knowledge of computer science is suggested at the level of ECDL (European Computer Driving Licence) full standard.
LEARNING OUTCOMES	Learning outcomes according to the Dublin descriptors: - Objective 1: Knowledge and understanding The student will acquire the theoretical knowledge necessary to understand the problems related to the analysis, design, and implementation of sound and music computing system. The student will thus study the theoretical foundations and the principal topics of current research. Finally, the class will discuss esthetical aspects. To achieve this goal, the course will include lectures; class discussions; seminars and panels. - Objective 2: Applying knowledge and understanding The student will acquire the practical capabilities necessary to design and implement case studies of sound and music computing system. He/she will be able to design a system starting from case studies, to identify the problems, to formulate algorithms, to implement and evaluate the performances of the proposed solutions. To achieve this goal, the course will include sessions in the lab, or autonomously, by analyzing the most important case studies and the programming language Python. - Objective 3: Making judgments The student will acquire the necessary methodologies to implement and evaluate simple sound and music computing system not previously discussed by the case studies by integrating all the notions acquired during the course. He/she will be able to analyze problem data at disposal, even if limited and incomplete, and to propose design solutions tailored to the problem at hand. The student will be able to compare strengths and weaknesses of the proposed solutions and to evaluate the performance of the solutions also by esthetical aspects. To achieve this goal, the course will include analysis and discussion of case studies; lectures on esthetical aspects of sound and music computing system; presentations performed by students team concerning their projects and implementations; preparation of a written essay. - Objective 4: Communication skills The student will be able to work in a team and to communicate with competence and correctness the issues related to the design, implementation and evaluation of sound and music computing systems. To achieve this goal, the course will include team sessions in the lab on the design and implementation of simple sound and music computing system; presentations and class discussions by the students teams. - Objective 5: Learning skills The student will be able to autonomously learn and study specific problems related to simple sound and music computing system by the literature of the field. To achieve this goal, the course will include seminars, panels and class discussion on the main research topics of sound and music computing system.
ASSESSMENT METHODS	Assessment methods will focus on the evaluation of learning outcomes of the course (see below) according to the Dublin descriptors. The final grade will be from 18/30 to 30/30 cum laude. - Assessment of Objective 1: Knowledge and understanding This objective will be assessed by an oral discussion concerning the theoretical topics of the syllabus. Objective 1 will count as 15% of the final grade. - Assessment of Objective 2: Applying knowledge and understanding This objective will be assessed by an oral discussion of sound and music computing case studies analyzed by the student during team sessions in the lab. Objective 2 will count as 15% of the final grade. - Assessment of Objective 3: Making judgments This objective will be assessed by a discussion of an essay, written at home and in the lab, by the student together with his/her student team. The essay will concern the design and implementation of a simple sound and music computing system as, e.g., an interactive system, a sonification system or a musical robot. A live demo of the system will have to be shown by the student team. In particular, Objective 3 will be assessed by discussing, in particular, the design and implementation choices performed by the student team. Objective 3 will count as 30% of the final grade. - Assessment of Objective 4: Communication skills This objective will be assessed by the oral discussions concerning Objectives 1,2,3 and by the analysis of the written essay concerning Objective 3. Objective 4 will count as 10% of the final grade. - Assessment of Objective 5: Learning skills This objective will be assessed by means of the discussion of the essay described in Objective 3. In particular, Objective 5 will be assessed by discussing, in particular, the theories and techniques autonomously learned by the student team and employed in the implementation of the sound and music computing system described in the written essay. Objective 5 will count as 30% of the final grade.
EDUCATIONAL OBJECTIVES	

	The general topics of Sound and Music Computing are in agreement with the ACM Computing Classification System. In particular, the educational objectives of the course cover all or parts of the Sound and Music Computing 2007 roadmap of the S2S2 (Sound to Sense, Sense to Sound) Consortium, established as Coordination Action by European Commission under 6th FET Open Call: http://smcnetwork.org/roadmap More in details, the lectures of the course will cover the "in-focus content areas" reported in Appendix A of the roadmap, representing the core disciplines of a course in Sound and Music Computing: - Sound Modelling - Sound Analysis and Coding - Music Information Processing - Music Performance The lab of the course will cover the fundamental of computer music programming. It will be in agreement with the ACM/IEEE CS 2013 Body of Knowledge and it will cover parts of the following Knowledge Units. Knowledge Area: Software Development Fundamentals Knowledge Unit: Algorithms and Design Topics Covered: - The concept and properties of algorithms - The role of algorithms in the problem-solving process Knowledge Area: Software Development Fundamentals Knowledge Unit: Fundamental Programming Concepts Topics Covered: - Basic syntax and semantics of a higher-level language - Variables and primitive data types (e.g., numbers, characters, Booleans) - Expressions and assignments - Simple I/O including file I/O - Conditional and iterative control structures - Functions and parameter passing Knowledge Area: Software Development Fundamentals Knowledge Unit: Fundamental Data Structures Topics Covered: - Arrays - Records/structs (heterogeneous aggregates) - Strings and string processing
TEACHING METHODS	The overall format of the course is: - Lectures (14 hours) - Lab sessions (12 hours) - Class discussions (4 hours)
SUGGESTED BIBLIOGRAPHY	- Curtis Roads: Composing Electronic Music: A New Aesthetic. Oxford University Press, 2015. - Bill Manaris, Andrew R. Brown: Making Music with Computers: Creative Programming in Python. Chapman & Hall/CRC, 2014. - Jorge Solis, Kia Ng (a cura di): Musical Robots and Interactive Multimodal Systems. Springer, 2011.

SYLLABUS

Hrs	Frontal teaching
2	Introduction of sound and music computing
2	Sound modelling
2	Sound analysis and coding
2	Music Digital Information Processing
2	Digital Music Performances
2	Sound and music interactive digital systems
2	Musical robots

Hrs	Workshops
2	Elements of music and code in Python
2	Musical data structures in Python
2	Transformations, processes, Iteration and lists of musical data
2	Randomness and choices in sound and music computing
2	Case studies of sonification and interactive digital music systems
2	Case studies of musical robot programming

Hrs	Others
4	Discussion on aesthetics aspects of sound and music computing