

	Fundamentals of Acoustics (Room 3i)	Hot Topic 1 (Room 10i)	Hot Topic 2 (Room 8i)	Hot Topic 3 (Room 12i)	Hot Topic 4 (Room 4i)	Hot Topic 5 (Room 11i)	Hot Topic 6 (Room 1i)	Hot Topic 7 (Room 7i)	Hot Topic 8 (Room 6i)		
		Environmental acoustics + Soundscape	Aeroacoustics	Auralization	Acoustic Product Design	Metamaterials	Metrology and measurement science in acoustics	Acoustic Analysis of Speech and Voice	Toolboxes for auditory modelling and psychoacoustic research		
DAY 1 - 08/09/2023											
13:00-14:00	Registration (Entrance Lobby)										
14:00-14:30	Plenary I: Keynote by prof. Monika Rychtáriková (Rooms 1i and 3i)										
14:30-15:00											
15:00-15:30	Coffee Break (Classrooms Lobby)										
15:30-16:00	Introduction (why do we study acoustics) (Francesco Martellotta)	Linking environmental noise and human behaviour, mobility, nightlife, noise annoyance (Cristina Pronello)	Theoretical: Beamforming for source identification and in ducted system (Riccardo Zamponi and Christophe Schram)	Introduction to the topic (Lamberto Tronchin)	The process of acoustic product design (Bartosz Chmielewski)	Presentation of the Summer School and the instructor team – Presentation of the "participants' competition" (GENERAL)	Acoustic, ultrasound & vibration metrology (Alessandro Schiavi)	(THEORETICAL) – Singing voice analysis and experimental approaches (Nathalie Henrich Bernardoni)	AMT: Introduction (Piotr Madjak, Alejandro Osses & Roberto Barumerli)		
16:00-16:30	Basic signal properties: Period, wavelength and frequency. (Francesco Martellotta)			Workshop on technical aspects of spatial audio reproduction (Marco Berzborn & Lukas Aspöck)	Introduction to psychoacoustics and sound quality (André Fiebig)	AMMs mechanisms for sound absorption (THEORY), including presentation of the 3 AMMs models selected for the workshop – (Vicente Romero-García)	Reference primary standards and calibration for vibration measurements (Alessandro Schiavi)		AMT: How to use it (Piotr Madjak)		
16:30-17:00	The perception of acoustic properties: Loudness, pitch and timbre (Francesco Martellotta)			Psychoacoustics in case study (André Fiebig)	AMMs applications in the Engineering fields (CASE STUDIES) – Phononic Vibes and Multiwave	Ultrasound metrology and applications (Gianni Durando)	(PRACTICAL) – Speech technologies for Voice Analysis (Nathalie Henrich Bernardoni)		AMT: Hands on, setup (Piotr Madjak)		
17:00-17:30	Tutorial: from analog to digital, first steps into sound analysis (Francesco Martellotta)								AMT: Hands on, applications (Piotr Madjak)		
17:30-18:00											
DAY 2 - 09/09/2023											
08:30-09:00	Plenary II: Carrier paths in Acoustics - prof. Rosa Maria Alsina Pages, Dr. Luca D'Alessandro, Dr. Laura Rossi, Dr. Finnur Pind (Rooms 1i and 3i)										
09:00-09:30											
09:30-10:00											
10:00-10:30	Coffee Break (Classrooms Lobby)										
10:30-11:00	More advanced signal properties: Pure and complex sounds, frequency decomposition and sound spectrum. (Maarten Hornikx)	Perspectives on environmental noise in EU / Quiet areas - current guidelines (EU/National) (Francesco Asdrubali)	Theoretical: Advanced non-intrusive techniques for aeroacoustics (Daniele Ragni)	Introduction to Virtual Acoustics & Geometrical Acoustics (Peter Svensson)	Understanding the product - from sound generation to emission (Bartosz Chmielewski)	Building an AMM model from scratch using COMSOL, considering viscous losses (THEORY/PRACTICAL) – (Noé Jimenez)	The measure of listening. How to design and perform effective listening tests for products optimization (Laura Rossi)	(THEORETICAL) – Acoustic analysis and benefits for phonetics and phonology (Barbara Gili Fivela)	Virtual Acoustics: Introduction (Lukas Aspöck)		
11:00-11:30	Acoustic quantities: levels and their manipulation, Octave bands and physiology of hearing, binaural hearing. (Maarten Hornikx)				Benchmarking and target sound development (André Fiebig)	Working group formation (students will form WGs of 3-4 persons and choose one of the 3 AMMs models to tune for the competition) (PRACTICAL)			Virtual Acoustics: Hands on (Lukas Aspöck)		
11:30-12:00	Tutorial: Catching your first sound spectrum (Maarten Hornikx)								BRT: Introduction (Arcadio Reyes Lecuona)		
12:00-12:30	Lunch (Classrooms Lobby)										
12:30-13:00											
13:00-13:30											
13:30-14:00	Definitions, and fundamental equations for propagation of sound. (Francesco Martellotta)	Environmental noise & pandemic/lockdown (Francesco Asdrubali)	Theoretical: Aeroacoustics measurements and simulations in wind energy applications (Stefan Oerlemans)	Auralization in industry (Eckhard Kahle)	Performance of acoustic measurements of DUT [Workshop] (Kinga Ziomek)	Parametric optimization of selected AMMs models by participants using COMSOL (PRACTICAL) + YRAM network presentation (Théo Cavallieri)	The measure of listening (Laura Rossi)	(THEORETICAL) – Speech technologies (Franco Cutugno)	rtSOF: Introduction (Bernhard Seeber)		
14:00-14:30	The general solution of the wave equation in free space. (Francesco Martellotta)			Binaural Rendering, Room Simulation and Auralization (Lukas Aspöck)			Speed of sound (Roberto Gavioso)		rtSOF: Hands on (Bernhard Seeber)		
14:30-15:00	Tutorial: visualizing sound (Francesco Martellotta)										
15:00-15:30	Coffee Break (Classrooms Lobby)										
15:30-16:00	Wave-surface interactions, 1D wave equation solution including reflection coefficient (Maarten Hornikx)	Introduction and basic concepts for the soundscape approach (Jian Kang)	Applied: Aeroacoustics measurements in large wind tunnel facilities (Alessandro Di Marco & Alessandro Aquili)	Hands-On: Room Auralization (Lukas Aspöck & Marco Berzborn)	Analysis of measurements and review of technical solutions (Kinga Ziomek)	Parametric optimization of selected AMMs models by participants using COMSOL (PRACTICAL)	Acoustic thermometry (Roberto Gavioso)	(PRACTICAL) – Speech technologies and scripting (Antonio Origlia)	RAZR: Introduction (Stephan Ewert)		
16:00-16:30	Sound absorption, types of sound absorption materials (Maarten Hornikx)	The ISO 12913 standard series on soundscape (Francesco Aletta)			Acoustic model - possibilities, calibration and evaluation. Acoustic simulation of product (Pawel Nieradka)		Discussion on the numerical approach issues and overall Q&A + Selection of the best AMMs model developed by participants (PRACTICAL)		Metrological Traceability of Acoustic Pressure (Fabio Saba)	(PRACTICAL) – Introduction to statistical analysis of acoustic measures of speech (Paolo Mairano)	RAZR: Hands on (Stephan Ewert)
16:30-17:00	Tutorial: how to use wave equations to calculate sound absorption coefficients (Maarten Hornikx)	Defining soundscape intervention applications: case studies, evaluation and design (Jian Kang & Francesco Aletta)								AFC: Introduction (Stephan Ewert)	
17:00-17:30								AFC: Hands on (Stephan Ewert)			
DAY 3 - 10/09/2023											
08:30-09:00	Sound insulation, governing principles. (Maarten Hornikx)	Indoor soundscaping as an emerging theme in soundscape studies (Simone Torresin)	Theoretical: Computational aeroacoustics and acoustic analogies (Francesco Avallone)	Introduction to Spatial Audio (Franz Zotter & Jens Ahrens)	Acoustic measurements of modified product and assessment [Workshop] (Kinga Ziomek)	Impedance tube measurements of the best AMMs model + results discussion (PRACTICAL)	Practical applications of vibration metrology (Alessandro Schiavi)	(THEORETICAL) – Phonetic parameters for dysarthric speech + (PRACTICAL) – Data analysis of normal and disordered speech (Helmer Strik)	BRAVI: Introduction (Massimiliano Masullo)		
09:00-09:30		The Soundscape tool [Introduction] (Andrew Mitchell)		Two-Channel Stereophony, Multichannel Stereophony, Transaural (Franz Zotter & Jens Ahrens)	Summary of results of workshop measurements and analyses (Kinga Ziomek)				BRAVI: Introduction - Hands on (Massimiliano Masullo & Francesco Sorrentino)		
09:30-10:00		Tutorial: quantifying wall insulation (Maarten Hornikx)							BRAVI: Hands on - Applications (Francesco Sorrentino)		
10:00-10:30	Coffee Break (Classrooms Lobby)										
10:30-11:00	Sound propagation in open and enclosed spaces. Introduction to reverberation. (Francesco Martellotta)	The Soundscape tool [Workshop] (Andrew Mitchell)	Theoretical: Applications of LBM to aeroacoustic problems of industrial relevance (Damiano Casalino)	Wave Field Synthesis, Ambisonics (Franz Zotter & Jens Ahrens)	TEST	Comparison of expected and measured performance of the selected AMM, pros and cons, discussion with participants (THEORY + PRACTICAL) + Final Test	Instrumentation for speed of sound and vibration measurements (Alessandro Schiavi & Roberto Gavioso)	(THEORETICAL) – Phonetic parameters for L2 learner speech + (PRACTICAL) – Data analysis of normal and L2 learner speech (Catia Cucchiari)	LTFAT: Introduction (Clara Hollomey)		
11:00-11:30				Hand-On/Tech-Demos: Sound field recording, simulation and reproduction - Workshop (Marco Berzborn & Lukas Aspöck)							LTFAT: Hands on, setup (Clara Hollomey & Nicki Hollighaus)
11:30-12:00				Tutorial: measuring reverberation time (Francesco Martellotta)							LTFAT: Hands on, applications (Clara Hollomey & Nicki Hollighaus)
12:00-12:30	Final TEST										
12:30-13:00	Closing Ceremony (Rooms 1i and 3i)										
13:00-13:30											
13:30-14:00	Lunch										
14:00-14:30											