



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Biomedicina, Neuroscienze e Diagnostica avanzata		
ACADEMIC YEAR	2022/2023		
BACHELOR'S DEGREE (BSC)	NEUROPHYSIOPATHOLOGY TECHNIQUES		
INTEGRATED COURSE	NON-INVASIVE BRAIN STIMULATION: PRINCIPLES AND TECHNIQUES		
CODE	22333		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	MED/26, MED/48		
HEAD PROFESSOR(S)	BRIGHINA FILIPPO	Professore Associato	Univ. di PALERMO
OTHER PROFESSOR(S)	DAVI' ROSARIA	Professore a contratto	Univ. di PALERMO
	BRIGHINA FILIPPO	Professore Associato	Univ. di PALERMO
CREDITS	4		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	2		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	BRIGHINA FILIPPO Wednesday 15:00 - 16:00 Neurofisiopatologia Policlinico c/oc/o Istituto Medicina del lavoro, via del Vespro 143: previa prenotazione via mail: filippobrighina@gmail.com		

DOCENTE: Prof. FILIPPO BRIGHINA

PREREQUISITES	notions of electroencephalography and evoked potentials
LEARNING OUTCOMES	The set of modules that make up the integrated course is designed and organized to provide the student with the theoretical and technical knowledge for the understanding and application of non-invasive brain stimulation techniques to the study of cortical functions to the therapy of neuropsychiatric pathologies and 'use in neurophysiological monitoring in cranial spinal neurosurgery, techniques based on magnetic fields (transcranial magnetic stimulation: TMS) and those on electric fields (tES) will be presented. At the end of the course the student will be ready to apply the acquired knowledge and the practical use of non-invasive brain neurostimulation techniques in all its clinical and research applications.
ASSESSMENT METHODS	Oral exam Vote in thirtieths excellent 30-30 cum laude excellent knowledge of the topics, excellent language properties, good analytical ability, the student is able to apply knowledge for solve the proposed problems very good 26-29 Good command of the topics, full ownership of language, the student is able to apply knowledge to solve the proposed problems good 24-25 basic knowledge of the main topics, good language properties, with limited ability to autonomously apply knowledge to the solution of the problems proposed satisfactory 21-23 he does not have full mastery of the main teaching topics but neither possesses the knowledge, satisfactory language properties, poor ability to independently apply the acquired knowledge sufficient 18-20 minimum basic knowledge of the main topics of teaching and of technical language, very little or no ability to independently apply acquired knowledge insufficient does not possess an acceptable knowledge of the contents of subjects
TEACHING METHODS	Frontal lessons

MODULE NON INVASIVE BRAIN NEURO-STIMULATION <i>Prof. FILIPPO BRIGHINA</i>	
SUGGESTED BIBLIOGRAPHY	
Materiali didattici forniti dall'esaminatore: articoli scientifici, diapositive	
AMBIT	10343-Scienze e tecniche di neurofisiopatologia
INDIVIDUAL STUDY (Hrs)	30
COURSE ACTIVITY (Hrs)	20
EDUCATIONAL OBJECTIVES OF THE MODULE	
In this module the student will acquire the theoretical notions, principles and methodological bases concerning the study of non-invasive brain neurostimulation techniques. He will be introduced to the study of all the procedures based on non-invasive stimulation (transcranial electrical stimulation (tES) and magnetic stimulation (transcranial magnetic stimulation: TMS). The multiple applications of the 2 techniques will be presented: TMS: single pulse magnetic stimulation , with double or repetitive stimulus, theta burst, paired associative stimulation); tES: stimulation with direct current- transcranial direct current stimulation- (TDCS) or alternating current, transcranial alternate stimulation (tACs) or with random noise - transcranial random noise stimulation (tRNS)	

SYLLABUS

Hrs	Frontal teaching
3	Non-invasive brain stimulation: general aspects
3	transcranial magnetic stimulation: principles and methods
3	Single and double pulse transcranial magnetic stimulation: clinical and research applications
3	repetitive transcranial magnetic stimulation and theta-burst frequencies: plastic effects and therapeutic applications
2	New TMS applications for the study of cortical activity: the TMS-EEG
2	Transcranial electrical stimulation: principles and methods
4	Transcranial electrical stimulation with direct and alternate currents; effects of modulation of brain activity and clinical and research applications

MODULE
NON-INVASIVE NEUROSTIMULATION TECHNIQUES

Prof.ssa ROSARIA DAVI'

SUGGESTED BIBLIOGRAPHY

Materiale didattico (articoli scientifici e diapositive) fornito dal docente.

AMBIT	10343-Scienze e tecniche di neurofisiopatologia
INDIVIDUAL STUDY (Hrs)	30
COURSE ACTIVITY (Hrs)	20

EDUCATIONAL OBJECTIVES OF THE MODULE

In this module the student will acquire the technical and applicative notions concerning the study of non-invasive brain neurostimulation techniques. He will be introduced to the technical aspects and operating methods of all the procedures based on non-invasive stimulation (transcranial electrical stimulation (tES) and magnetic stimulation (transcranial magnetic stimulation: TMS). The multiple applications of the 2 techniques will be presented: TMS: single pulse magnetic stimulation with double or repetitive stimulation, theta burst, paired associative stimulation; tES: stimulation with direct current - transcranial direct current stimulation-TDCS or alternating, transcranial alternate stimulation (tACs) or with random noise - transcranial random noise stimulation (tRNS)

SYLLABUS

Hrs	Frontal teaching
3	Non-invasive brain stimulation: general technical aspects
3	Single and double-pulse magnetic stimulation: technical aspects and application methods
3	Single and double pulse transcranial magnetic stimulation: technical aspects and application methods
3	repetitive and theta-burst transcranial magnetic stimulation: technical aspects and application methods
2	New TMS applications for the study of cortical activity: TMS-EEG, technical and applicative aspects
3	Transcranial electrical stimulation with direct currents: technical and applicative aspects
3	Transcranial electrical stimulation with alternating currents: technical and applicative aspects