

Guía docente de la asignatura

Fecha de aprobación por la Comisión Académica: 28/06/2023

Neuroanatomía y Neuroimagen Funcional (M30/56/2/28)

Máster

Máster Universitario en Neurociencia Cognitiva y del Comportamiento

MÓDULO

- Metodológico
- Metodológico (Itinerario en Neuropsicología)

RAMA

Ciencias de la Salud

CENTRO RESPONSABLE DEL TÍTULO

Escuela Internacional de Posgrado

Semestre

Primero

Créditos

4

Tipo

Optativa

Tipo de enseñanza

Presencial

BREVE DESCRIPCIÓN DE CONTENIDOS (Según memoria de verificación del Máster)

- General organization of the nervous system
- Location, structure and functions of the Spinal cord and Brain stem.
- Location, structure and functions of the Diencephalon.
- Location, structure and functions of the Cerebellum and Basal Ganglia.
- Location, structure and functions of the Limbic System.
- Functional organization of the Cerebral cortex.
- Introduction to Functional neuroimaging.
- Neuroimaging modalities, analysis strategies and their usefulness.

COMPETENCIAS

COMPETENCIAS BÁSICAS

- CB6 - Poseer y comprender conocimientos que aporten una base u oportunidad de ser



originales en desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación.

- CB7 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio.
- CB8 - Que los estudiantes sean capaces de integrar conocimientos y enfrentarse a la complejidad de formular juicios a partir de una información que, siendo incompleta o limitada, incluya reflexiones sobre las responsabilidades sociales y éticas vinculadas a la aplicación de sus conocimientos y juicios.
- CB9 - Que los estudiantes sepan comunicar sus conclusiones y los conocimientos y razones últimas que las sustentan a públicos especializados y no especializados de un modo claro y sin ambigüedades.
- CB10 - Que los estudiantes posean las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo.

RESULTADOS DE APRENDIZAJE (Objetivos)

Students will know / understand:

- The location and function of the main brain structures, and the main fascicles that connect them.
- Printed and online tools and Apps (iPad, Android) available to strengthen knowledge in functional neuroanatomy.
- The different types of neuroimaging techniques currently available, their operating bases, the different varieties of images they offer, and the different types of analysis applicable to these data.

Students will be able to:

- Locate the main brain structures in various types of material (3D models and figures, printed atlases, web pages, structural neuroimaging – ie T1, T2- in sagittal, axial and coronal orientations) and locate the main brain fascicles in diffusion neuroimaging (DTI).
- Know the functions associated with the main brain structures.
- Understand the operating bases of the main current neuroimaging tools, the types of analysis available for the data they offer, and the type of information that each contributes to the field of functional neuroanatomy.
- Start using some neuroimaging analysis programs, such as SPM, MRICro/N, etc.

PROGRAMA DE CONTENIDOS TEÓRICOS Y PRÁCTICOS

TEÓRICO

- Introduction and organization of the course



- General organization of the nervous system
- Neuroanatomic development from the ventricular system
- Spinal cord, brain stem, cerebellum and basal ganglia
- Diencephalon
- Limbic system
- Functional organization of the cerebral cortex
- 2D anatomy: atlas and anatomical plates
- 3D anatomy: neuroanatomical models and structural images of Magnetic Resonance
- Neuroimaging techniques: Structural and functional magnetic resonance, Electroencephalography and Brain stimulation

PRÁCTICO

- Neuroimaging modality analysis strategies and utility of each of them in the field of functional neuroanatomy.

BIBLIOGRAFÍA

BIBLIOGRAFÍA FUNDAMENTAL

CORE BIBLIOGRAPHY:

- Haines D.E. & Mihailoff, G. (2019). Principios de Neurociencia. Aplicaciones básicas y clínicas. (5ªEd) Elsevier Saunders.
- Functional Magnetic Resonance Imaging (Third Edition). Huettel, S.A Song, A.W McCarthy, G. Sunderland, Ma. USA: Sinauer Associates, Inc. 2014.

BIBLIOGRAFÍA COMPLEMENTARIA

ADDITIONAL BIBLIOGRAPHY:

- Blumenfeld, H (2015). Neuroanatomy through clinical cases. Sinauer.
- Catani, C., & Thiebaut de Schotten, M. (2012). Atlas of human brain connections: Oxford University Press. Crossman, A. & Neary, D. (2019) Neuroanatomía. Texto y Atlas en Color. (6ªEd) Ed. Elsevier. ISBN: 9788491135708
- Felten, D. - O'banion, K. - Maida, M. (2016) Netter Atlas De Neurociencia (3ªEd) Ed. Elsevier. ISBN: 9788445826652
- Felten DL y Summo M. (2019) Netter. Cuaderno de Neurociencia para colorear. Elsevier,
- Haines, D. (2015) Neuroanatomía Clínica. Texto y Atlas, 9e. Wolters Kluwer.
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- clínicas. (5ªEd) Elsevier Saunders.
- Jacobson S., Marcus E.M., Pugsley S. (2018). Neuroanatomy for the neuroscientist (3th. Edit.) Springer.
 - Kiernan, J. A. y Rajakumar N. (2014). Barr. El SN humano. Lippincott Williams & Wilkins.
 - Naidich, T., Cha, S., Smirniotopoulos, J. (2017) Imagenología Del Cerebro. Ed. Amolca
 - Netter, FH. (2006) Atlas de Anatomía Humana. 3ª ed. Barcelona: Masson
 - Hendelman W. et al. (2015) Atlas of functional neuroanatomy. CRC press, 3rd ed.
 - Osborn, A. (2018) El Encéfalo. Diagnóstico por imagen, patología y anatomía. Panamericana
 - Patestas, M. y Gartner, L. (2016) A Textbook of Neuroanatomy. Wiley.
 - Pfaff DW, Wolkow, N.D. (2017). Neuroscience in the 21st century (Second Edition).
 - Purves, D. (2015) Neurociencia. Ed. Panamericana.
 - Passingham, R.E. & Rowe, J.B. (2016) A Short Guide to Brain Imaging: The Neuroscience of Human Cognition. Oxford: OUP
 - Puelles López (2008). Neuroanatomía. Panamericana
 - Rojkova, K., Volle, E., Urbanski, M., Humbert, F., Dell'Acqua, F., & Thiebaut de Schotten, M. (2016). Atlasing the frontal lobe connections and their variability due to age and education: a spherical deconvolution tractography study. Brain Struct Funct, 221(3), 1751-1766. doi:10.1007/s00429-015-1001-3 (ver también material suplementario de este artículo).
 - Vanderah, T., Gould, D. J. (2020). Nolte's the human brain: an introduction to its functional anatomy (7th edit.) Elsevier.

ENLACES RECOMENDADOS

Interactive atlases:

http://www.thehumanbrain.info/head_brain/

<http://brainmaps.org/>

<http://human.brain-map.org/>

<http://3d-brain.ki.se/index.html><http://library.med.utah.edu/WebPath/HISTHTML/HISTO.html#1>

<http://www.anatomyatlases.org/atlasofanatomy/index.shtml>

MRicro: <http://www.mccauslandcenter.sc.edu/mricro/>

MRicron: <http://www.mccauslandcenter.sc.edu/mricro/mricron/>

Oxiris: <http://www.osirix-viewer.com>

Statistical Parametric Mapping (SPM): <http://www.fil.ion.ucl.ac.uk/spm/>

ExploreDTI: <http://www.exploredti.com>



FSL: <https://fsl.fmrib.ox.ac.uk/fsl/fslwiki>

Tractotron: <https://fsl.fmrib.ox.ac.uk/fsl/fslwiki>

TrackVis: <https://fsl.fmrib.ox.ac.uk/fsl/fslwiki>

StarTrack: <https://www.mr-startrack.com>

EVALUACIÓN (instrumentos de evaluación, criterios de evaluación y porcentaje sobre la calificación final)

EVALUACIÓN ORDINARIA

- Tests, exercises and problems, solved in class or individually throughout the course (50%).
- Final evaluation of reports, works, projects, etc. (individual or group; 10%)
- Written tests and/or essays (20%)
- Contributions of students in discussion and attitude in the different activities carried out (20%)

Article 18 of the UGR Assessment Policy and Regulations establishes that the ordinary assessment session (convocatoria ordinaria) will preferably be based on the continuous assessment of students, except for those who have been granted the right to a single final assessment (evaluación única final), which is an assessment method that only takes a final exam into account

EVALUACIÓN EXTRAORDINARIA

The Article 19 of the UGR Assessment Policy and Regulations establishes that students who have not passed a course in the ordinary assessment session (convocatoria ordinaria) will have access to an extraordinary assessment session (convocatoria extraordinaria). All students may take part in this extraordinary assessment session, regardless of whether or not they have followed continuous assessment activities. In this way, students who have not carried out continuous assessment activities will have the opportunity to obtain 100% of their mark by delivering all the work assigned in the course and / or by carrying out a test or work in substitution of some or all of such deliveries.

EVALUACIÓN ÚNICA FINAL

The article 8 of the UGR Assessment Policy and Regulations establishes that students who are unable to follow continuous assessment methods due to justifiable reasons shall have recourse to a single final assessment (evaluación única final), which is an assessment method that only takes a final exam into account.

In order to opt for a single final assessment (evaluación única final), students must send a request, using the corresponding online procedure, to the coordinator of the master's programme, in the first two weeks of the course or in the two weeks following their enrolment (if the enrolment has taken place after the classes have already begun). The coordinator will communicate this information to the relevant teaching staff members, citing and verifying the



reasons why the student is unable to follow the continuous assessment system.

The evaluation in such a case will consist of the delivery of all the work assigned in the course and / or carrying out a test or work in substitution of some or all of such deliveries.

INFORMACIÓN ADICIONAL

TEACHING METHODOLOGY

In-class sessions (32 hours)

- Presentation by lecturers
- Critical analysis and discussion of articles or clinical cases in group
- Oral presentations of individual and group clinical work or cases
- Individual and group work with neuroimaging analysis programs (e.g. MRIcro / n, SPM)
- Working with neuroanatomy models and pictures

In-person exam (4 hours)

Individual work (64 hours)

- Critical reading of articles
- Preparation of oral presentations.
- Carrying out work on specific topics and / or resolution of clinical cases.
- Neuroanatomy slide resolution
- Neuroimaging exercises resolution

Teaching and assesment methodologies will be adapted to students with specific needs (NEAE), in accordance with the Article 11 of the Regulations for the evaluation and qualification of students of the University of Granada. The course will highlight the contribution of women scientists and minorities to scientific and tecnological developments in the field, as recommended by the II Equality Plan of the UGR.

Información de interés para estudiantado con discapacidad y/o Necesidades Específicas de Apoyo Educativo (NEAE): [Gestión de servicios y apoyos](https://ve.ugr.es/servicios/atencion-social/estudiantes-con-discapacidad) (<https://ve.ugr.es/servicios/atencion-social/estudiantes-con-discapacidad>).

