



Teaching Guide

| Identifying Data | | | | | 2022/23 |
|----------------------------|--|---------------|-----------------------|----------------|-----------|
| Subject (*) | Nuclear explorations in neurology: SPET and PET. Digital neuroimaging | | | Code | 610490011 |
| Study programme | Mestrado Universitario en Neurociencia (Plan 2011) | | | | |
| Descriptors | | | | | |
| Cycle | Period | Year | Type | Credits | |
| Official Master's Degree | 2nd four-month period | First | Optional | 3 | |
| Language | SpanishGalician | | | | |
| Teaching method | Face-to-face | | | | |
| Prerequisites | | | | | |
| Department | Fisioterapia, Medicina e Ciencias Biomédicas | | | | |
| Coordinador | Pereira Loureiro, Javier | E-mail | javier.pereira@udc.es | | |
| Lecturers | Pereira Loureiro, Javier | E-mail | javier.pereira@udc.es | | |
| Web | talonis.citic.udc.es/formacion | | | | |
| General description | <p>Block II of the subject is taught on-line through the Moodle platform. Classroom hours are used to answer questions or work in groups.</p> <p>In this course, students must achieve the following objectives.</p> <ul style="list-style-type: none"> - Analyze the fundamentals of modern radiopharmacy (PET and SPECT) for the study of neurological processes - Transfer of basic concepts to clinical and lay the basis for future isotopic explorations - Analyze isotope nuclear explorations (PET and SPECT) and the daily use for routine use in hospitals of Public Health Service. - Know the new systems of medical imaging - Understand the molecular fundaments of the pharmacological treatment of the neurological diseases. - Know the theoretical bases of the digital image of neuroscience. - Understand differences between the types of images used in neuroscience - Understand the importance of the medical imaging and research trends, particularly in the field of neuroscience. - Know to do medical imaging processing, using free and commercial software | | | | |

Study programme competences / results

| Code | Study programme competences / results |
|------|--|
| A10 | Coñecer os principais métodos empregados pola neurociencia cognitiva actual, con especial acento nas técnicas psicofisiolóxicas, neuropsicolóxicas e de neuroimaxe. |
| B2 | Coñezan e saiban utilizar as técnicas experimentais dos campos da neurociencia obxecto do seu interese. |
| B3 | Posúan un grao de especialización, o que significa o coñecemento de problemas, teorías e técnicas específicas, en polo menos un campo da neurociencia. |
| B5 | Saiban aplicar os coñecementos adquiridos e a súa capacidade de resolución de problemas en ámbitos novos ou pouco coñecidos dentro de contextos máis amplos (ou multidisciplinares) relacionados coa neurociencia. |
| B8 | Saiban traballar en grupos de carácter multidisciplinar |
| C3 | Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida. |
| C8 | Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade. |

Learning outcomes

| Learning outcomes | Study programme competences / results | | |
|--|---------------------------------------|------------|-----|
| Know the technological principles of the software and hardware for working in digital neuroimaging | AR10 | BR3 BR5 | CR3 |



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|--|------|-------------------|-----|
| Know a department of nuclear medicine, both from a clinical and technological perspective | AR10 | BR2 BR5 BR8 | CR8 |
| Know how to behave in department of digital neuroimaging, management and processing data using computer tools. | AR10 | BR2 | CR3 |
| Know the communication and storage standards DICOM and NIFTI in the field of neuroimaging | AR10 | BR2 BR3 | CR3 |

| Contents | |
|--|--|
| Topic | Sub-topic |
| BLOCK I: NUCLEAR ISOTOPIC STUDIES IN NEUROLOGY | <p>Introduction</p> <ul style="list-style-type: none"> - Biological fundaments of diseases of the central nervous system - Medical imaging systems - Radiopharmacy. Biological fundaments of studies with radiopharmaceuticals - Quality control of radiological protection devices and bases - The cyclotron - Study of cerebral perfusion - Pharmacological modulation of cerebral vascularization - Isotopic study of: Brain perfusion, Dementias, Tumors, Epilepsies, Brain death, Dopaminergic receptors, Other processes <p>PET. Physical principles. QA. Radiopharmacy. Clinical applications. Future uses. The cyclotron of Hospital of Santiago de Compostela: Research lines</p> |
| BLOCK II. MEDICAL DIGITAL NEUROIMAGING | <ul style="list-style-type: none"> - Principles of digital neuroimaging. The digital imaging. Principles and codification of information. The graphic formats of the digital image. General formats and specific formats in neuroscience. - The DICOM standard. Digital imaging and communications in Medicina. Modalities of digital imaging in neuroscience - Sources of generation of imaging in neuroscience. Radiology, CT, MRI, Nuclear medicine. <p>DICOM Applications</p> <ul style="list-style-type: none"> -Applications and viewers free and commercial of DICOM imaging. - Neuroimaging applications. The NIFTI format. |
| PRACTICAL CLASS PROGRAM | <p>Block I</p> <p>Practice 1. Visit to the Nuclear Medicine Department Service of Hospital of the University of Santiago de Compostela</p> <p>Practice 2. To do PET and SPECT isotopic studies in neurology and psychiatry</p> <p>Practice 3. Visit to the Cyclotron</p> <p>Block II</p> <p>DICOM and NIFTI medical image management practices with free software</p> |

| Planning | | | | |
|--------------------------------|------------------------|--------------------------------------|-------------------------------|-------------|
| Methodologies / tests | Competencies / Results | Teaching hours (in-person & virtual) | Student?s personal work hours | Total hours |
| Case study | A10 B2 B3 B5 B8 C8 | 5 | 5 | 10 |
| ICT practicals | B2 B5 B8 C3 C8 | 10 | 25 | 35 |
| Guest lecture / keynote speech | A10 B2 B3 B5 C8 | 5 | 5 | 10 |
| Online forum | B8 C3 | 8 | 8 | 16 |
| Personalized attention | | 4 | 0 | 4 |

(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.



Methodologies

| Methodologies | Description |
|--------------------------------|--|
| Case study | In the visit to the nuclear medicine service of the CHU in Santiago will propose cases that will be studied by the student and discussed |
| ICT practicals | Using the e-learning platform, neuroimaging practices will be carried out within the deadlines established by the proposed calendar |
| Guest lecture / keynote speech | Theoretical fundamentals of the course will be presented in class. Contents can be followed with the online media available on the e-learning platform. Assistance is optional |
| Online forum | Active participation in the forums of the platform will be an part of the course |

Personalized attention

| Methodologies | Description |
|--|---|
| Case study ICT practicals Online forum | It is intended that each student individually work in the field of neuroimaging focusing on their lines of interest. Being a subject with very heterogeneous students in relation to their basic training will try to look for topics of interest to each one |

Assessment

| Methodologies | Competencies / Results | Description | Qualification |
|--------------------------------|------------------------|---|---------------|
| Case study | A10 B2 B3 B5 B8 C8 | Practices in the CHUS nuclear medicine service | 50 |
| ICT practicals | B2 B5 B8 C3 C8 | The delivery of the exercises on the scheduled dates through the platform of e-learning | 35 |
| Guest lecture / keynote speech | A10 B2 B3 B5 C8 | Videotutorials available in the platform of e-learning are necessary to be able to carry out the exercises correctly. | 5 |
| Online forum | B8 C3 | Active and intelligent participation in the forum will be evaluated in the final evaluation. | 10 |
| Others | | | |

Assessment comments

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| In order to overcome the complete subject, it is necessary to take a minimum of scoring in each of the two sections. Attendance is mandatory in Block I |
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Sources of information

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|----------------------|---|
| Basic | <ul style="list-style-type: none"> - Souto M, García P. (2001). El ojo clínico de la Red. Santiago de Compostela: Universidad de Santiago de Compostela - Deinendengen LE, Shreeve WW, Eckelman WC, Bahk YW, Wagner HN jr. (2003). Molecular nuclear Medicine. Heidelberg : Springer Verlag - Von Schulthes GK (2003). Clinical molecular anatomic imagingf. Philadelphia : Lippincott W&W - NEMA (2022). DICOM Standard Status. Base Standard. http://medical.nema.org/ - ACR: American College of Radiology (2022). Neuroimaging . http://www.acr.org - Maestú F, Cabestrero R, Ríos M (2008). Neuroimagen : técnicas y procesos cognitivos. Barcelona : Masson |
| Complementary | |

Recommendations

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| Subjects that it is recommended to have taken before |
| Subjects that are recommended to be taken simultaneously |
| Subjects that continue the syllabus |



Other comments

In Block II we use the tele-learning platform created by the teacher. (the institutional Moodle does not support access of students from outside universities)

All the works are delivered through the teletraining platform in digital format without the need for printing, which contributes to an education based on a sustainable model.

 Learning platform: <https://www.imerdir.udc.es/formacion>

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.