

Degree Course of Physiotherapy

INTEGRATED COURSE: PHARMACOLOGY AND NEUROPSYCHIATRICS SCIENCES

CFU: 8

SSD: MED/26- BIO/14 – MED/25 – MED/27

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MODULE: Pharmacology

CFU: 2

SSD: BIO/14

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MODULE: NEUROLOGY

CFU: 2

SSD: MED/26

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MODULE: NEUROSURGERY

CFU: 1

SSD: MED/27

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MODULE: PSYCHIATRY

CFU: 1

SSD: MED/25

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PREREQUISITES

Pharmacology

The student must have basic knowledge of biology, biochemistry, microbiology, physiology and general pathology that allows him to understand the contents of the program related to pharmacokinetics and pharmacodynamics of the drugs studied.

Neurology

There are no specific prerequisites, however the study of Neurology requires knowledge of basic anatomy a physiology of central and peripheral nervous system and synaptic functioning.

Neurosurgery

Basic concepts of Histology and Human Anatomy. Principles of Human Physiology, Cellular Biology and Biochemistry. Basic elements of Physic. Fundamentals of General Pathology.

Psychiatry

No prior exams are necessary to follow the course, however, in order to understand the course, the student should have basic knowledge of human biology and physiology, elements of medical pathology and pharmacology.

LEARNING OBJECTIVES

Pharmacology

After completing the course, students should be able to understand and describe the basic principles of pharmacology, in particular notions of pharmacokinetics and pharmacodynamics, and the study phases for the development of new drugs. Students should also know the main pharmacological strategies used for anticancer and antibacterial therapies, for the treatment of inflammation, pain, cardiovascular and respiratory diseases.

Neurology

Essential learning objectives of this course are the ability to describe the damage and the etiopathogenetic mechanisms subtending the most common diseases affecting the central and the peripheral nervous system and their clinical and instrumental diagnostic process. The course will also aim at providing knowledge to discern the neurobiological mechanisms favouring the recovery from acute and chronic neuronal damage as well as the mechanisms that support plasticity, including functional properties of circuitries. The course will achieve its objectives through lectures and interactive learning activities with the aim of improving students ability to understand and solve the main issues emerging in everyday clinical practice.

Neurosurgery

Fundamental and indispensable objectives are the following:

- To acquire precise scientific knowledge necessary to classify and correctly define the neurosurgical diseases most frequently encountered in the clinical setting.
- Comprehension of the main pathophysiological mechanisms responsible of the neurological deficit. Identify the origin of the impairment and define its type and natural history.

Psychiatry

The course is aimed at providing the fundamentals of psychopathology and the history of psychiatry and a basic knowledge of pathophysiology, the clinic and the treatment of the main psychiatric disorders.

LEARNING OUTCOMES

Pharmacology

Knowledge and understanding

Knowledge of the basic principles of pharmacokinetics, pharmacodynamics, clinical pharmacology and of the main classes of drugs.

Applying knowledge and understanding

At the end of the course the student will be able to judge the basic efficacy and toxicity of the main classes of drugs.

Communication skills

At the end of the course the student will have to know how to properly use scientific terminology in the field of pharmacology.

Making judgements

At the end of the course, the student will be able to make general assessments about the efficacy, the toxicity and the differences between different classes of drugs.

Neurology

knowledge and understanding

At the end of the course students will:

- be able to discern the most common signs of neurological diseases and locate the lesion site
- be able to define the clinical and etiopathogenetic characteristics of the main pathologies affecting the central and the peripheral nervous system, particularly the diseases affecting motor pathways, balance and language
- be able to perform a complete neurological examinations, including cognitive function assessment
- know the main diagnostic methods used in neurological clinical practice to locate damage, perform a diagnosis and estimate prognosis; acquire basic confidence onto modern circuitry vision (mirror neurons, default system)
- understand the main mechanisms leading to functional recovery
- have basic notions of neuropharmacology, particularly symptomatic therapies

Applying knowledge and understanding

At the end of this course students will be able to use the new knowledge to:

- Correctly assess neurologic patients
- Further autonomously develop knowledge on specific aspects relative to their future professional practice

Knowledge and understanding

At the end of this course students will be able to

- Use the new knowledge to correctly assess the main neurological pathologies, their aetio-pathogenesis and prognosis
- To understand the rationale and the aim of specific rehabilitative programmes
- To master theoretical and practical tools to autonomously develop further understanding of neuroabilitative issues that students will face in their professional practice

communication skills

At the end of this course students will have to:

- Be able to correctly use scientific terminology

making judgements

At the end of this course students will have to be able to:

- Critically assess what they learned
- Autonomously assess neurological patients from a neuro-rehabilitative perspective

Neurosurgery

Knowledge and understanding

At the end of this course the student will acquire:

- Basic knowledge of the “functional” anatomy of the crano-cerebral system.
- Basic knowledge of the “functional” anatomy of the vertebro-medullary system.
- Knowledge and ability to detail the principles of their applied physiology.
- Knowledge of the general principles underlying the Intracranial Pressure.
- Knowledge of the most recent acquisitions concerning CSF-related pathologies.
- Ability to classify and distinguish the different types of spontaneous intracranial hemorrhages and to understand their different prognosis.
- Elements and basic principles of Cranial Traumatology and related outcomes.
- Elements and basic principles of Spinal Traumatology and related syndromes and outcomes.
- Capability to classify the most common Brain tumors and their general aspects.
- Capability to classify the most common Spine tumors and their general aspects.
- Knowledge of the most common spinal degenerative diseases.

Applying knowledge and understanding.

At the end of this course the student will be able to:

- Apply the acquired notions to correctly identify and define a neurological impairment or a determined outcome, go back to the origin, know its natural history and understand the rationale of the rehabilitation objectives.
- Dispose of a sufficient body of knowledge to allow further autonomous deepening on more specific subjects included in the vast world of neuro-rehabilitation.

Communication skills.

At the end of this course the student will be able to:

- Use technical and proper terminology to describe any common neurosurgical scenario. To correctly describe the pathophysiology and the mechanism generating the disease.

Making judgment.

At the end of this course the student will be able to:

- Correctly pursue a general assessment concerning the anatomical, physiological and clinical aspects of a certain neurosurgical condition and to predict a possible prognosis.

Psychiatry

knowledge and understanding

At the end of this course the student should be aware of:

- main concepts of psychopathology
- primary elements of the main psychiatric disorders
- principles of treatment of the main psychiatric disorders

Applying knowledge and understanding

At the end of the course, the student should have acquired:

- the ability to recognize the main psychiatric disorders
- the ability to describe the main psychiatric disorders

communication skills

At the end of the course, the student will have to use correctly the main terms of psychopathology in the appropriate context.

making judgements

At the end of the course, the student should know how to carry out general assessments of the topics covered.

COURSE SYLLABUS

Syllabus Pharmacology

- General principles of pharmacology.
- Development of new drugs and study phases. Clinical trial of drugs.
- Pharmacodynamics.
- Pharmacokinetics and factors that influence it. Drug interactions.
- Antibacterial chemotherapy.
- Antineoplastic chemotherapy.
- General principles of Target Therapy.
- Monoclonal antibodies.
- Treatment of pain inflammation. Glucocorticoids, NSAIDs, opioid analgesics.
- General principles of cardiovascular therapy.
- Medicines for the treatment of asthma and the treatment of anaphylactic shock.

Syllabus Neurology

- Approach to the patient with neurological diseases
- Language abnormalities
- Neurobiological mechanisms of spasticity and rigidity and treatment approach
- Imaging (MRI, CT scan) and electrophysiologic techniques (evoked potentials, electromyography, electroneurography, electroencephalography) for neurologic diagnosis
- Synaptic plasticity and neurobiology of rehabilitation
- Cerebrovascular diseases
- Multiple sclerosis and other inflammatory demyelinating diseases
- Motorneurons disease
- Parkinson's disease and other movement disorders
- Alzheimer's disease and other neurodegenerative disorders
- Genetic and acquired diseases of the peripheral nerves
- Myasthenia gravis and other diseases of the neuromuscular junction
- Infections of the nervous system (viral including SARS, bacterial, prionic)

Syllabus Neurosurgery

Principles of Neuro-anatomy and Physiology: the Cranio-Cerebral System.

- Topographic Anatomy of the skull and functional Anatomy of the brain. Functional networks. Anatomy and physiology of the cranial nerves. Anatomy of the cerebral blood vessels. Anatomy of the ventriculo-cisternal system.

Pathophysiology of Intracranial Pressure (ICP).

- Homeostasis of intracranial volumes. Definition of ICP. The Pressure-volume relationship. Cerebral Perfusion Pressure. Cerebral Blood Flow. Cerebral Edema. Syndrome of elevated ICP.

Cerebro-spinal fluid (CSF) related pathologies.

- CSF: Intrinsic properties, production and reabsorption. CSF dynamics. Hydrocephalus: classification and pathophysiology. Syringomyelia. Pseudotumor Cerebri. Normal Pressure Hydrocephalus.

Brain Tumors.

- Principles of Neuro-oncology. W.H.O. Classification. Gliomas. Meningiomas. Secondary tumors (metastasis).
- Traumatic Brain Injury (TBI).

Biomechanical aspects. State of consciousness alteration. Post-traumatic intracranial bleedings. Diffuse axonal injury. Brain Concussion. Outcomes following TBI.

- Spontaneous Intracranial Hemorrhages.

Hemorrhagic Strokes. Subarachnoid hemorrhage. Intracranial aneurysms. Artero-venous malformations. Venous Malformations. Intracerebral hematomas. Related Outcomes.

- Principles of Neuro-anatomy and Physiology: the vertebro-medullary system.

General anatomy of the spine. The cranio-vertebral junction. Anatomy and functional organization of the spinal cord. Spinal nerves. Topographic anatomy of the cervical, dorsal and lumbo-sacral spine and the related spinal cord segments.

Traumatic Spinal Injury (TSI).

- Biomechanical aspects. Principles of vertebral fractures classification. Post-traumatic spinal cord syndromes. The A.S.I.A. system. Outcome following TSI.

Spinal Tumors.

- Classification and general aspects. Primary and secondary tumors. Spinal cord compression syndromes. Prognosis of spinal tumors.

Spinal degenerative disease.

- Disks degeneration and related pathology. The concept of spinal instability. Spondylosis myelopathy. Radiculopathies. The Low back pain.

Syllabus Psychiatry

Introduction to psychiatry

- Notes on history of psychiatry
- Elements of psychopathology

The main psychiatric disorders and their treatment:

- Schizophrenia
- Mood disorders
- Anxiety disorders
- Obsessive Compulsive Disorder
- Disorders associated with traumatic or stressful events
- Personality disorders
- Hysteria and disorders with somatic symptoms
- Eating disorders
- Substance Use Disorder and Behavioral Addictions

Legislation and organization of territorial psychiatric assistance

COURSE STRUCTURE

Pharmacology

The lessons (20 hours) are held by projecting illustrative images (Power-Point) and through the use of paper material provided by the teacher.

Neurology

The course is delivered through 20 hours of lectures, divided into 2-3 hours-long sessions accordingly with academic schedule. The lectures will be supported by slides and screening of didactic videos. Moreover, during the course there will be occasion for interactive practical activities relevant to the content of the lectures.

Neurosurgery

The course provides a total of 20 hours of frontal lessons divided in six 3h lessons and one 2h (final) lesson. Frontal teaching will include slides and clips projection, followed by interactive discussion of clinical cases related to the lesson topic.

Psychiatry

The teaching will be delivered through 10 hours of lectures with discussions on exemplary clinical cases.

COURSE GRADE DETERMINATION

The exam of Pharmacology and Neuropsychiatric Sciences is organized as follows: a written exam for Neurology, Pharmacology and Psychiatry, and an oral exam for Neurosurgery.

Written exams verify the acquisition of expected knowledge and skills without notes and/or textbooks.

Assessment parameters constitute the specific knowledge of the topic, along with the ability to organize knowledge discursively, critical approach and competence in the use of specialized language.

The results will be expressed into grades out of thirtieths.

The oral exam will assess the student's ability to apply acquired knowledge and show proficiency in the discussion of clinical cases. Furthermore, it will also be assessed: the ability in making judgements, communication skills, efficiency in the use of terminology and reasoning skills as described in the Dublin descriptors.

Students will pass the exam with a minimum score of 18/30 obtained in every module that constitute the integrated course.

In the final grade determination, Professors will take into consideration the outcomes achieved in the various modules, adopting the following criteria:

Unsuitable: *Poor or lacking knowledge and understanding of the topics; limited capacity for analysis and synthesis, frequent generalizations of the required contents; inability to use technical language.*

18-20: *Just enough knowledge and understanding of topics, with obvious imperfections; just sufficient capacity for analysis, synthesis and independent judgement; poor ability to use technical language.*

21-23: *Sufficient knowledge and understanding of topics; sufficient capacity for analysis and synthesis with the ability to logically and coherently argue the required contents; sufficient ability to use technical language.*

24-26: *Fair knowledge and understanding of the topics; discrete capacity for analysis and synthesis with the ability to rigorously argue the required contents; Good ability to use technical language.*

27-29: *Good knowledge and understanding of required content; good capacity for analysis and synthesis with the ability to rigorously argue the required contents; good ability to use technical language.*

30-30L: *Excellent level of knowledge and understanding of the requested contents with an excellent capacity for analysis and synthesis with the ability to argue the requested contents in a rigorous, innovative and original way; Excellent ability to use technical language*

OPTIONAL ACTIVITIES

Pharmacology

Students will have the opportunity to carry out theoretical exercises at the end of the lessons. The teacher will provide constant support during and after.

Neurosurgery

Besides the frontal didactics, opportunities to focus and expand any topics will be granted to the student, in an extra-time setting. This supplemental activity should be discussed in advance with the teacher. The issues reviewed in these sessions will not be considered examination matter.

READING MATERIALS

Pharmacology

- Bertram G. Katzung. Basic and Clinical Pharmacology. 15th edition, 2021.
- Slide sets provided by the teacher.

Neurology

- Adams and Victor's Principles of Neurology 11th ed. McGraw-Hill Medical
- Kandel ER, Schwartz JH, Jessell TM 2012, Siegelbaum SA, Hudspeth AJ. 'Principles of Neural Science, 5th ed. McGraw-Hill, New York
- Fuller G. Neurological Examination Made Easy Ed. Churchill Livingstone
- www.pubmed.com

Neurosurgery

During each lesson the teacher will support the student with an abundant source of references, indicating the most important and recent literature to read. Fundamental Book Chapters will be also provided, directly by the teacher. Neurosurgery fundamentals. Ed. Nitin Agarwal. New York: Thieme, 2019. ISBN: 9781626238251

Visione Consigliata. <https://youtu.be/EqvEs5yeYEM>

Psychiatry

A Short Textbook of Psychiatry: 20th Year Edition by Niraj Ahuja, Jaypee Brothers Medical Pub