UNICAMILLUS

Medicine and Surgery degree course

Academic Year 2026 / 2027

INTEGRATED COURSE (I.C.): NEUROLOGICAL SCIENCES
NUMBER OF CFU (ECTS credits): 6 ECTS
SSD (Academic Discipline Code): MED/26, MED/27, MEDS-22/B

COORDINATOR OF THE I.C.: Andrea Romigi
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MODULE 1: Neurology
NUMBER OF CFU (ECTS credits): 4 ECTS
SSD (Academic Discipline Code): MED/26
LECTURER: Professor Andrea Romigi (Coordinator)
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LECTURER: Professor Luigi Maria Edoardo Grimaldi
e-mail: luigi.grimaldi@unicamillus.org

MODULE 2: Neurosurgery
NUMBER OF CFU (ECTS credits): 1 ECT
SSD (Academic Discipline Code): MED/27
LECTURER: Professor Stefano Signoretti
e-mail: stefano.signoretti@unicamillus.org

MODULE 3: Neuroradiology
NUMBER OF CFU (ECTS credits): 1 ECT
SSD (Academic Discipline Code): MEDS-22/B
LECTURER: Professor Marta Iacobucci
e-mail: marta.iacobucci@unicamillus.org

PREREQUISITE COURSES

None required

PREREQUISITES

It would be desirable that the student has already acquired the basic notions on Neuroanatomy and Neurophysiology.

LEARNING OBJECTIVES

We propose an integrated course aimed at translating from basic to clinical knowledge.

This interdisciplinary course will link different subspecialties into an integrated and comprehensive program. By completion of the program, students will have adequate knowledge of the main neurological diseases, their pathophysiology and treatment. The Neurosurgery module provides an overview on neurological diseases and of their surgical management and technological advancements. The neuroradiology module integrates diagnostic procedures of central and peripheral nervous system, focusing on the main neurological and neurosurgical disorders.

I The evolution of neurology.
II. Neurology in the multi-morbidity of the elderly.
III. Brain death: ethical and legislative aspects.
IV. The role of electrophysiology in neurology
V. The importance of sleep medicine in the context of neurology
VI Ethics of research in Neuroscience
VII Neurosurgical management of neurological diseases.
VIII. Imaging diagnostics in neurological disorders.

EXPECTED LEARNING OUTCOMES

At the end of the course the student must be able to know the basic directions of diagnosis and therapy of the main pathologies of the central NS of neurological interest; besides, he/she will acquire the basic competence to deal with neurological emergencies and to utilize the key semeiotic tools. Further, he/she will be capable to address properly the anatomo-physiological-clinical correlations, which lead to proper diagnosis and therapy path. Also, the student should be able to diagnose and know the treatment of the main CNS and PNS diseases of neurosurgical interest, such as: hydrocephalus and intracranial hypertension syndrome, head and spine trauma, ischemic and hemorrhagic stroke, cerebrovascular malformations, brain and spinal tumors, spinal degeneration disease, CNS and spinal infections in neurosurgery, pediatric neurosurgical pathologies, peripheral neurosurgical diseases, functional neurosurgery. Neuroanatomy and neurophysiology of neurosurgical interest will be also reviewed. Furthermore, the student will be able to recognize and interpret the main neuroradiological patterns of the central and peripheral nervous system.

DD1: Knowledge and understanding

- **Neuroanatomy and Neurophysiology:** Students will acquire an in-depth knowledge of the structures and functions of the nervous system, crucial for the correct diagnosis and treatment of neurological diseases.
- **Major Diseases of the Central and Peripheral Nervous System:**

  Epilepsy and Headache: Understanding the causes, underlying mechanisms, and therapeutic options.

  Stroke and Other Vascular Pathologies: Detailed knowledge of different types of strokes (ischemic and hemorrhagic), understanding of vascular malformations such as aneurysms and angiomas, and in-depth exploration of prevention strategies, diagnosis, and emergency interventions.

Neuroinflammatory Diseases: Insights into multiple sclerosis and other inflammatory conditions of the CNS.

Infections of the Nervous System: Understanding the diagnostic and therapeutic strategies for CNS infections.

Degenerative Diseases: Focus on Parkinson's disease, dementias, and other degenerative conditions of the nervous system.

Neuromuscular Disorders: Including myasthenia gravis, muscular dystrophies, and neuropathies.

Sleep Disorders and Consciousness Alterations: Understanding the importance of sleep medicine and managing conditions such as syncope, coma, and brain death.

- **Neurosurgery:** Knowledge acquisition on major neurosurgical pathologies, including surgical techniques and diagnostic procedures for conditions like hydrocephalus, cranial and spinal traumas, and tumors of the nervous system.
- **Methods of Diagnosis and Treatment:** Ability to use advanced diagnostic tools, including neuroimaging, and to apply evidence-based treatments.
- **Management of Neurological Emergencies:** Knowledge and skills necessary to address and manage neurological emergencies, with a practical approach to neurological semiotics.
- **Neuroradiology:** Recognize and interpret the main neuroradiological patterns using the most common imaging techniques (CT, MRI, CT/MR angiography). Acquire knowledge of normal and pathological radiological anatomy of the central and peripheral nervous system. Identify and differentiate the major congenital, vascular, traumatic, tumoral, inflammatory, degenerative, and infectious conditions. Learn the main interventional techniques in the neurovascular field, understanding their indications and the key aspects of pre- and post-procedural imaging. Apply a systematic approach by integrating clinical data with neuroimaging findings, and interact effectively within a multidisciplinary team.

DD2: Applying knowledge and understanding

Students will be able to recognize neurologic clinical conditions and to apply the acquired knowledge of neuroanatomy and neurophysiology, to diagnosing and managing main Nervous System's pathologies. They will be granted advanced diagnostic methods and rigorously evidence-based treatments. Finally, the understanding of these practical applications will allow the students to learn the first therapeutic pathways, particularly in urgent clinical setting.

DD3: Making judgements

- Students will develop autonomy in evaluating complex clinical situations, using their theoretical knowledge and critical analysis skills. They will be able to synthesize clinical and research data to form independent judgments that consider ethical, social, and scientific variables, showing responsibility in clinical decisions and patient management.

DD4: Communication skills

- They will be capable of effectively communicating neurological information, both in clinical and academic settings, using appropriate scientific language. They will be able to explain disease mechanisms, treatment plans, and prevention recommendations to colleagues, patients, and non-specialized health personnel, ensuring that communication is clear, precise, and adapted to the audience.

DD5: Learning skills

- They will demonstrate the ability to continue learning independently in the field of neurology, staying updated with the latest developments through research and self-education. They will be prepared to undertake further advanced studies, specializations, and research activities, with a constant commitment to improving their professional skills.

SYLLABUS

NEUROLOGY SYLLABUS

At the end of the Neurology course, any candidate will acquire competence around the main neurological diseases, including: epilepsy; headache; stroke; neuro-inflammatory diseases including multiple sclerosis; infections of the nervous system; spinal cord diseases; diseases of the cerebellum, including ataxias; Parkinson's and Parkinsonisms; dementias; dystonia; myasthenia; muscular dystrophies and other myopathies; diseases of the motor neuron; inflammatory, metabolic, toxic and hereditary mono- and poly-neuropathies; headaches / migraines; sleep disorders; alterations of consciousness, syncope, coma, brain death.

NEUROSURGERY SYLLABUS

The main pathologies of the Central and Peripheral Nervous System will be explored and discussed. Key issues such as Cerebrospinal Fluid and Intracranial Pressure dysfunctions will be introduced as they represent the foundation to understand Head Injury pathophysiology and ischemic and hemorrhagic stroke. Cerebrovascular malformations, brain and spinal tumors, spine trauma and spine degenerative diseases will be also approached. Neuroanatomy and neurophysiology related to these pathology will be reviewed, focusing on each of the aforementioned issues.

NEURORADIOLOGY SYLLABUS

The course aims to provide theoretical and practical knowledge in the field of imaging diagnostics of the central and peripheral nervous system, with particular focus on the clinical and radiological-anatomical aspects of the main neurological disorders. The program is structured into the following thematic areas: normal radiological anatomy of the nervous system; major congenital malformations and developmental anomalies; neurovascular diseases and endovascular techniques; cranio-spinal trauma; intracranial tumors; neuroinflammatory, infectious, and neurodegenerative disorders; hydrocephalus and CSF flow disorders; epilepsy; major diseases of the spine and spinal cord; and imaging of the peripheral nervous system.

COURSE STRUCTURE

The course is divided into lectures, divided between 40 hours of neurology, 10 hours of neurosurgery and 10 hours of neuroradiology. Professors will use teaching tools such as slides with explanatory diagrams, illustrations, images and interactive tools. Films and animations from scientific journal or international universities will be used to integrate the processes described in class. Interactive tests will be organized and integrated AI teaching methods will also be used. Attendance is compulsory.

COURSE GRADE DETERMINATION

The evaluation parameters that will be used, among others, will be: ability to gather and organize knowledge; critical thinking skills; quality of exposure, competence in the use of specialized vocabulary, effectiveness, linearity). The exam will include a written test consisting of 30 multiple choice questions (20 questions on Neurology Module, 5 questions on Neurosurgery module and 5 questions on Neuroradiology) and 4 brief free topics (2 for neurology 1 for neurosurgery and 1 for neuroradiology). The free topic requires a brief effective written explanation. To pass the exam, students must achieve a sufficient level of knowledge in **each of the three modules**.

The whole examination will be evaluated as it follows:

Insufficient	severe poor knowledge of the subject, very limited skill in the analysis of specific items.
18-20	knowledge of the subjects of sufficient quality characterized by frequent imperfections. Analysis and reasoning skills of sufficient quality.
21-23	standard knowledge of the specific subject; analysis and reasoning skill of acceptable quality.
24-26	good knowledge of the subjects and good analysis and reasoning skills; arguments are expressed in a rigorous way.
27-29	very good knowledge of the specific scientific subjects, valid analysis and reasoning skills, significant skill in making judgements.
30-30L	outstanding knowledge of the specific knowledge of the scientific tasks. Exceptional analysis, reasoning and making judgments skills.

OPTIONAL ACTIVITIES

Extra sessions and Interactive tests may be organized to deliver additional information on-line.

Furthermore, one of the extended lessons (3 hours) will be presented in the form of a seminar with in-depth analysis of research topics (including the invitation to competent field experts).

READING MATERIALS

NEUROLOGY READING MATERIALS

Updated neurology tests such as

1. Berardelli et al.(ed. Esculapio 2023) Neurology at Sapienza
2. Principles of Neural Sciences, Kandel et al. 6th Edition Ed. Mc Graw Hill

However, the key concept is that the training of the medical students will also benefit from the material provided by the teacher. Prof Romigi and Prof Grimaldi will solicit and provide insights with numerous references to modern updated reviews or videos easily accessible on the web; this permits the sharing of

neurological semeiotics in a more effective manner, which represents a crucial knowledge necessary for any specialist (with particular reference to those who will work in the emergency room and / or emergency services).

NEUROSURGERY READING MATERIALS

- *Handbook of Neurosurgery,* 10th Edition by Mark S. Greenberg
- *Comprehensive Neurosurgery Board Review*, 3rd Edition by J.S. Citow
- *Spine Essentials Handbook: A Bulleted Review of Anatomy, Evaluation, Imaging, Tests* by K. Singh
- https://www.neurosurgicalatlas.com (strongly recommended)

NEURORADIOLOGY READING MATERIALS

- Essentials of Osborn's Brain, A Fundamental Guide for Residents and Fellows , Anne G. Osborn, Elsevier - Health Sciences Division
- Imaging Anatomy Brain and Spine by Anne G. Osborn, Karen L. Salzman, Jeffrey S. Anderson, Arthur W. Toga, Meng Law, Jeffrey Ross, Kevin R. Moore, Elsevier - Health Sciences Division