



## **Neuroimaging Written Examination Content Outline**

REV 1/11/07

The UCNS Neuroimaging examination was established to determine the level of competence for Neuroimaging specialists.

The following content outline is provided to candidates interested in the certification examination. The content outline consists of two primary categories followed by subcategories. A complete description of the core content required of Neuroimaging specialists can be found in the Neuroimaging Core Curriculum at: <http://www.ucns.org/certification>.

The written examination consists of 200 multiple choice questions.

	<b>Content Area</b>	<b>Percentage of Questions</b>
<b>I.</b>	<b>Technical Aspects/Physics</b>	<b>20 %</b>
<b>II.</b>	<b>Clinical Aspects/Applications</b>	<b>80 %</b>

### **I. Technical Aspects/Physics**

#### **A. *X-ray Computed Tomography***

1. X-ray production
2. Collimation
3. Interaction of X-ray in tissue
4. CT radiation safety
5. CTA
6. CT contrast agents
7. CT artifacts
8. CT perfusion

#### **B. *Magnetic Resonance Imaging***

1. MRI hardware and safety
2. Electricity and nuclear magnetism
3. Radiofrequency pulse sequences
4. MRI signals and parameters

5. Fourier transforms
6. Conventional spin-echo technique
7. Gradient-echo technique
8. Fast spin-echo and fast imaging
9. Echo planar imaging
10. MRA
11. MRI Contrast agents
12. MRI artifacts
13. MR spectroscopy
14. Diffusion and perfusion MRI

C. *Nuclear Medicine*

1. General principles of SPECT imaging
2. General principles of PET imaging

**II. Clinical Aspects/Applications**

A. *Primary Tumors/Masses/Cysts*

1. Astro-Glial (Glioma)
2. Germ Cell
3. Maldevelopmental
4. Meningeal
5. Mesenchymal and Lymphoreticular
6. Neuronal Origin
7. PNET
8. Peripheral Nervous System
9. Regional Neoplasms
10. Non-neoplastic Cysts
11. Spinal tumors

B. *Metastatic Disease*

1. Brain/spinal parenchymal metastases.
2. Calvarial and meningeal metastases
3. Extra-axial spinal metastases

C. *Cerebrovascular Diseases*

1. Infarction
2. Hemorrhage
3. Aneurysms
4. Vascular malformations
5. Spinal cord infarction and hemorrhage

D. *Trauma*

1. Cerebral contusions/Traumatic Brain injury
2. Spinal Hemorrhage/Spinal Trauma

- E. *Infectious/Granulomatous Diseases*
  - 1. Pyogenic/Bacterial
  - 2. Viral
  - 3. Fungal
  - 4. Parasitic
  - 5. Sarcoidosis
  - 6. Prion-associated
  - 7. Myelitis
  
- F. *Toxic/Metabolic Diseases*
  - 1. Chemotherapeutic/Immunosuppressive agents
  - 2. Ethanol-related
  - 3. Hepatic failure
  - 4. Mitochondrial disorders
  - 5. Radiation injury
  - 6. Toxin exposure
  - 7. Wilson's disease
  
- G. *Degenerative Diseases*
  - 1. Dementias
  - 2. Parkinsonian syndromes
  - 3. Motor neuron diseases
  - 4. Ataxias
  - 5. Spinal degenerative diseases
  
- H. *Seizures/Epilepsy*
  - 1. Mesial temporal lobe sclerosis
  - 2. Cortical migration disorders
  
- I. *Hydrocephalus/CSF Disorders*
  - 1. Benign Intracranial Hypertension
  - 2. Hydrocephalus
  - 3. Intracranial Hypotension
  
- J. *Neurocutaneous Syndromes*
  - 1. Neurofibromatosis
  - 2. Sturge-Weber Syndrome
  - 3. Tuberous sclerosis
  - 4. Von Hippel-Lindau and Hemangioblastomas
  
- K. *Demyelinating/Inflammatory Diseases*
  - 1. Multiple Sclerosis
  - 2. Acute Disseminated Encephalomyelitis
  - 3. Central Pontine Myelinolysis
  - 4. Myelitis

L. *Congenital Anomalies/Developmental Disorders*

1. Brain malformations
2. Spinal cord and spinal canal malformations

M. *Miscellaneous*

1. Normal tomographic imaging anatomy of head and spine
2. Incidental findings outside the neuro axis
3. Orbital and pituitary imaging