



**Study program:** Doctoral Academic Studies in Biomedical Sciences

**Name of the subject:** ADVANCED IMAGING TECHNIQUES IN INTEGRATIVE RADIOLOGY, CLINICAL PATHOLOGY AND FORENSIC MEDICINE

**Teacher(s):** Sanja S. Stojanović, Viktor E. Til, Duško B. Kozić, Miloš A. Lučić, Katarina M. Koprivšek, Olivera R. Nikolić, Viktorija A. Vučaj Ćirilović, Jovan D. Lovrenski, Nataša M. Prvulović Bunović, Jelena V. Ostojić, Nada M. Vučković, Sandra R. Trivunić Dajko, Mirjana M. Živojinov, Milana D. Panjković, Siniša S. Babović

**Status of the subject:** elective

**Number of ECTS points:** 20

**Condition:** -

**Goal of the subject:**

The aim of this subject is to present current concepts of imaging technologies in radiology, clinical pathology and forensics to PhD students. Medicolegal aspects of applied radiology, pathology and forensic medicine, as well as the importance of anatomic variety and anthropometric parameters. The analysis of imaging methods and possibilities of imaging findings' interpretation in vivo and post mortem. Introduction with classification of body injuries, strengths and limitations of autopsy, correlations with pathologic and radiologic findings. Introduction with child abuse syndrome.

**Outcome of the subject:**

Students will be introduced the possibilities of joined practice in the field of legal expertise and acquire basic knowledge in strengths and limitations of certain methods in detection of injury mechanisms and death causes.

**Content of the subject**

*Theoretical lectures*

**Radiology**

1. Introduction to different radiologic modalities, the role of radiology in clinical practice and forensic medicine
2. Medicolegal aspects of applied radiology in forensic medicine (responsibilities in x-ray examinations, with focus on pregnant women and children), cumulative effect of radiation dose
3. Analysis of imaging diagnostics and possibilities of post mortem findings' interpretation
4. Determination of brain death
5. Possibilities of ballistic analysis for cold and hot weapons
6. Radiological findings in child abuse syndrome
7. Artificial intelligence in radiology

**Pathology**

1. Macroscopic characteristics of pathological states that are directly and/or indirectly associated with trauma, and states that are not related to trauma, e.g. violent death
2. Possibilities of pathohistologic verification directly and/or indirectly associated with trauma, and states that are not related to trauma, e.g. violent death in post mortem patients
3. Detection of ground disease and cause of death
4. Standards of sampling and handling materials for pathohistologic analysis during autopsy
5. Quality control in handling material obtained by biopsy and surgery for pathologic and cytologic analysis
6. Introduction with modern analysis that can be used in pathology for forensic purposes: immunohistochemistry, PCR, FISH and other methods for protein expression detectin, genetic amplification and mutations in different neoplastic and non-neoplastic disorders, that can be directly or indirectly associated with ground disease and cause of death.

**Forensic medicine**

1. Classification of body injuries and techniques of proofing
2. Types of expertise and necessary qualifications
3. Medicolegal aspects of obligatory autopsy

**Anatomy**

1. Interesting anatomic varieties that have implications in findings' interpretation
2. Possibilities of age and gender detection in relation to bone findings
3. Anthropometric measurements of inner organs in our population

*Practical lectures*

1. Examples of injuries, brain hemorrhages on different imaging modalities and their analysis (pathway of the force)
2. Practical examples and detection of typical injuries in child abuse syndrome
3. Low dose CT and possibilities of diagnostics with minimal applied radiation dose
4. Examples of autopsies with certain pathologic conditions that could have directly or indirectly been associated with lethal outcome
5. Examples of autopsies with certain pathologic conditions that were direct death cause, not associated with injury
6. Pathohistologic analysis of tissue samples obtained from the site of trauma/ crime scene (brain hemorrhages...)

**Recommended literature**

*Compulsory*

1. Rafiee H. Chapman & Nakielny's Aids to Radiological Differential diagnosis. Elsevier 7th Ed. 2019
2. Mitchell RN, Kumar V, Abbas AK. Robbins and Cotran Pathologic basis of Diseases, 9 ed. Elsevier, 2014
3. Lo Re G, Argo A, Midiri M, Cattaneo C (editors). Radiology in Forensic Medicine - From Identification to Post-mortem Imaging.: 2020.

*Additonal*

1. Thali JM, Viner MD, Brogdon BG. Brogdon's forensic radiology (sec.ed), CRC Press, Taylor&Francis Group 2010.
2. Brogdon BG, Shwayder T, Elifritz J. Child Abuse and Its Mimics in Skin and Bone. Taylor&Francis Group 2013.

Will be advised during every lecture of theoretical part

**Number of active classes**

**Theory: 60**

**Practice: 45**

**Methods of delivering lectures:** Lectures, workshops, seminars

**Evaluation of knowledge (maximum number of points 100)**

activity during lectures: 10

practical course: 10

seminar: 30

written exam: 50