GENERAL INFORMATION		
Course name	**Radiology**	
Course director	**Prof. Zvonimir Sučić, MD, PhD**	
Assistants	Asst. Prof. Otmar Rubin, MD, PhD Asst. Prof. Tamer Salha, MD, PhD	
Study program	**Integrated undergraduate and graduate university study program Medical Studies in German**	
Course status	Mandatory	
Year of study, semester	4th year, 8th semester	
Credits allocated and form of instruction	ECTS student workload	**6**
	Number of teaching hours (L+S+E)	**75** (25+15+35)

COURSE DESCRIPTION

Course objectives

The course will familiarize the medical student with the basics of applying ionizing radiation using conventional X-ray machines and CT, as well as the principles of ultrasound imaging and magnetic resonance imaging in diagnostic radiology and interventional radiology. The focus is on understanding the imaging methods of organs and organ systems, radiological pathology and symptomatology in relation to pathohistological findings, based on previously acquired clinical knowledge and skills. The units will be covered by students through lectures, seminars and exercises in the following order: Introduction – general radiology; CT, MSCT, MSCTA, MRI and MRA – physical principles; Thoracic organs; Osteoarticular system; Hepatobiliary and urogenital system; Gastrointestinal system; Vascular system and interventional radiology; Neuroradiology USG – imaging, physical principles; USG, Doppler, physical principles.

Course requirements

There are no specific requirements for this course except those defined in the study program curriculum.

Learning outcomes relevant to the study program

1.1, 2.1, 2.3, 3.1, 3.2, 4.2

Expected learning outcomes *(5-10 learning outcomes)*

Knowledge

1. Describe the essential devices used in diagnostic radiology and explain the operating principles of X-ray imaging devices, ultrasound and magnetic resonance imaging
2. Explain the biological effect of ionizing radiation and radiation protection procedures
3. Define fundamental radiological diagnostic procedures and the area of their application on certain tissues, organs, organ systems and body parts
4. Choose and apply the appropriate diagnostic procedure in accordance with the clinical picture and diagnosis
5. List contrast agents and describe possible side effects of X-ray contrast agents and contrast agents for magnetic resonance imaging
6. Explain the connection of radiologically visible pathological-anatomical changes with the clinical picture
7. Define interventional radiology procedures
8. Define the importance of joint work of the doctor who manages the patient, the radiologist and the pathologist in an interdisciplinary and multidisciplinary diagnostic and therapeutic team

Skills

1. Recognize anatomical and pathological structures on radiological images
2. Isolate a pathological shadow on a radiograph, a lesion on a CT scan, or a pathological signal on different magnetic resonance imaging (MRI) sequences
3. Estimate the radiation boundary between the pathological change and the surrounding healthy tissue and the characteristics of the edges of the lesion
4. Demonstrate radiological changes after surgical intervention and the progression or regression of the lesion after the radiological and/or chemotherapy procedure
5. Observe typical radiological signs in acute conditions (such as acute abdomen)
6. Adequately prepare the patient for the diagnostic or therapeutic procedure

Course content

General radiology, history of development of radiology, X-ray tube, grid, foils, cassette. Radiation protection of the patient and healthcare practitioners. *CT, MSCT, MSCTA, MRI and MRA* physical principles of operation of MSCT and MRI. MSCT and MRI angiography. Perfusion, diffusion, gradient techniques. *Thoracic organs*. Anatomy, pathophysiology. Specific and non-specific pneumonia. Pneumothorax, tumors, liquidothorax. *Osteoarticular system.* Trauma, fractures, inflammations, tumors, soft tissue pathology. MRI and MSCT as a diagnostic method. *Hepatobiliary and urogenital system.* Biliary colic – diagnostics. MRCP. USG and MSCT and MRI in diagnostics. MSCT and i.v. Urography. *Gastrointestinal system.* Examination of the gastroduodenum, bowel movement, irrigography, fistulography. *Vascular system and interventional radiology.* DSA, MSCTA, MRA, PTCA. Indications and contraindications. *Neuroradiology;* ischemic and hemorrhagic stroke, tumors, extra-axial haemorrhage, brain and spine trauma, herniated disk, demyelination. *USG – imaging, physical principles*. Development of diagnostic ultrasound, ultrasound imaging of the abdomen, urinary tract, breasts, joints and muscles. *USG, Doppler, physical principles.*. VB system, carotid system, peripheral arteries, diagnostics of venous thrombosis

Form of instruction	☒lectures ☒seminars and workshops ☒exercises ☐distance learning ☐field course	☐individual assignments ☐multimedia and Internet ☐laboratory ☐mentoring activities ☐other

Student obligations

Come to class prepared by studying the recommended literature for each unit and actively participate in all forms of instruction. The student must participate in at least 70% of classes to pass the course.

Monitoring student learning

Attendance	x	Active participation	x	Seminar paper		Experimental work	
Written exam	x	Oral exam	x	Essay		Research	
Project		Continuous assessment		Paper		Practical work	
Portfolio							

Assessment and evaluation of students during class and on the final exam

Students' performance will be evaluated during class and on the final exam. Students are evaluated numerically and descriptively (insufficient (1), sufficient (2), good (3), very good (4), excellent (5)). During classes, a student can earn a maximum of 100 points. Students can earn a maximum of 20 points during classes through different types of activities. On the final exam, students can earn a maximum of 80 points. The final grade represents the sum of the points earned during classes and on the final exam.

Mandatory reading

1. Reiser M, Kuhn FP, Debus J. Radiologie - Duale Reihe. Thieme; 2017

Additional reading		
The number of copies of mandatory reading in proportion to the number of students currently taking this course		
Title	*Number of copies*	*Number of students*
Reiser M, Kuhn FP, Debus J. Radiologie - Duale Reihe. Thieme; 2017	A purchased license for online textbooks shall be used https://bfdproxy48.bfd-online.de/login.htm?back=http%3a%2f%2fpartner.bfd-online.info.bfdproxy48.bfd-online.de%2fameos%2fbfdAboGateway%3faboId%3d264117 Access will be granted to all students enrolled in the study program	
Quality monitoring methods ensuring the acquisition of knowledge upon completion, skills and competences		
The quality of course performance is monitored through an anonymous student survey on the quality of the organization and conduction of classes, the course content and the work of professors. The usefulness of the lectures from the students' perspective, the curriculum content, the professor preparedness, the clarity of the presentation, the amount of new content and the quality of the presentation are evaluated. The curriculum and its execution are administratively compared. The participation of students in lectures and exercises, as well as the excuses for missing classes, are controlled and analyzed.		