

# SYLLABUS

The academic year when the cycle of instruction is commenced 2019-2025

Module/course name:	NUCLEAR MEDICINE		Module code	LK.3.F.009
Faculty:	Faculty of Medicine MUL			
Major:	Medical			
Specialty:				
Level of study:	I (Bachelor studies) <input type="checkbox"/> II (Master studies) <input type="checkbox"/> Integrated Master studies <b>X</b> Doctoral studies <input type="checkbox"/>			
Mode of study:	full-time <b>X</b> part-time (extramural)			
Year of study:	I <input type="checkbox"/> II <input type="checkbox"/> III <b>X</b> IV <input type="checkbox"/> V <input type="checkbox"/> VI <input type="checkbox"/>	Semester:	1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <b>X</b> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/>	
Module/course type:	obligatory <b>X</b> elective <input type="checkbox"/>			
Language of instruction:	Polish <input type="checkbox"/> English <b>X</b>			

Form of education	Hours
Lecture	
Seminar	3
Laboratory class	7
E-learning	
Practical class	
Internship	
Other	

**TOTAL**

Student's work input (participation in class, preparation, evaluation, etc.)	Student's hourly workload
1. In class	10
2. Student's own work including: 1 Preparation for class 2 Preparation for partials and finals	20
Summary of the student's workload	30

**ECTS points for module/course** 1

**Educational objectives:** Nuclear medicine course will provide the knowledge how the unsealed radioactive sources emitting radiation ( photons, positrons, negative beta particles, and alpha particles) are used in medicine in the detection and treatment of the diseases. The training emphasizes the diagnostic use of radiopharmaceuticals: imaging techniques (planar imaging, single photon imaging, positron emission tomography), imaging protocols, clinical indications and image interpretation. In addition to diagnostic applications, the principles of radionuclide therapy will be presented, including therapy of thyroid diseases, treatment of refractory metastatic bone pain, radiosynovectomy, peptide receptor therapy in neuroendocrine tumors.

**The matrix of learning outcomes for module/ subject with reference to verification methods of the intended educational outcomes and forms of instruction:**

Learning outcome code	A student who has obtained a credit for the module/course has the knowledge/skill to:	Methods of verifying the achievement of the intended learning outcomes:	Form of instruction  * provide the symbol
B.W6.	knows natural and artificial sources of ionizing radiation and its interactions with matter	multiple choice test	Seminar/ Laboratory class
E.W7.	<p><i>knows and understands the causes, symptoms, diagnostic principles (in relation to radioisotope diagnostics) and therapeutic procedures in respect to the most common internal diseases in adults and their complications:</i></p> <p>b) respiratory disorders, including: diseases of the respiratory tract, chronic bronchial asthma, obstructive pulmonary disease, bronchiectasis, mucoviscidosis, infections of the respiratory tract, interstitial diseases of the lungs, pleura, mediastinum, obstructive and central sleep apnea, respiratory failure (acute and chronic), malignancies of the respiratory system</p> <p>c) disorders of the digestive system, including: diseases of the oral cavity, esophagus, stomach and duodenum, intestines, pancreas, liver, biliary tracts and gallbladder</p> <p>d) disorders of the endocrine system, including diseases of hypothalamus and pituitary gland, thyroid, parathyroid glands, adrenal cortex and core, ovaries and testes, neuroendocrine tumors, pluriglandular hypofunction, various types of diabetes and metabolic syndrome; hypoglycemia, obesity, dislipidemia</p> <p>e) diseases of kidneys and urinary tract, including acute and chronic renal failure, glomerular disorders, interstitial renal disorders, renal cysts, urolithiasis, urinary infections, malignancies of the urinary system, and in particular, cancers of the urinary bladder and kidney</p> <p>g) rheumatic disorders, including systemic disorders of connective tissue, systemic vasculitis, arthritis involving the vertebral column, metabolic diseases of bones, in particular, osteoporosis and deformative arthrosis, gout</p>	multiple choice test	Laboratory class
E.W29.	knows principles of pain management ( <u>with radioisotope methods</u> ), including cancer and chronic pain	multiple choice test	Laboratory class

B.U2.	can assess damaging effect of ionizing radiation dose and observes principles of radiological protection	observation by a teacher	Seminar/ Laboratory class
K01	accepts interdisciplinary character of nuclear medicine. Observes methodological requirements in the field of radioisotopes usage as well as diagnostic and therapeutic methods. Accepts working in a group.	observation by a teacher	Seminar/ Laboratory class

#### EXAMPLES OF METHODS VERIFYING THE ACHIEVEMENT OF THE INTENDED LEARNING OUTCOMES:

**In terms of knowledge:** multiple choice questions

**In terms of skills:** observation by a supervisor/tutor

**In terms of social competences:** observation by a supervisor/tutor

**Course content:** (use keywords referring to the content of each class following the intended learning outcomes):

**Seminars:** 1. Basic physics in nuclear imaging and basic knowledge of nuclear medicine.

2. Radionuclide therapy. Types of radionuclide therapies. Indication and contraindications, procedure and physiological and pathophysiological basis of: radioiodine treatment of benign and malignant diseases, radioactive treatment of refractory bone pain in metastatic bone disease, radiosynovectomy. 3. Nuclear imagination of gastrointestinal tract. Indications, contraindications and practical use of: Salivary gland scintigraphy, Gastric Emptying and Motility scintigraphy, Liver and the spleen scintigraphy, Hepatobiliary tract imaging, Bleeding into gastrointestinal tract, Meckel's diverticulum imaging.

**Laboratory class:** 1. Thyroid and Parathyroid glands scintigraphy. Types of radionuclides which are used for Thyroid and Parathyroid imaging. Indications, contraindications and practical use of Thyroid and Parathyroid glands imaging. 2. Nuclear imaging of the skeletal system. Clinical applications of skeletal scintigraphy in metastatic disease, primary malignant and benign bone tumors, skeletal trauma, infarction and osteonecrosis, osteomyelitis and metabolic bone diseases. 3. Nuclear imaging of the brain. Brain perfusion scintigraphy. Positron emission tomography of the brain. Scintigraphic receptor imaging. 4. Nuclear cardiology. Myocardial perfusion imaging : physiological basis of procedure, protocols, stress and rest myocardial SPECT clinical indications, contraindications. Diagnostics patterns of myocardial stress/rest studies. Basis of myocardial viability study. 5. Pulmonary scintigraphy. Pulmonary Embolism- definition, symptoms, diagnostics. Ventilation scintigraphy. Perfusion scintigraphy. Comparison ventilation and perfusion scans. Definitions: match defects, miss-match defects. Genitourinary system in Nuclear Medicine. Renoscintigraphy- types, radionuclides in use, indications and contraindications, practical use. Dynamic renoscintigraphy. Types of renogram: normal and Pathological: long phases, cumulative, isostenuric, nephrectomic. Static scintigraphy. 6. Radionuclide tumor imaging. General indications for radionuclide tumor imaging. Tumor type specific imaging with Iodine 131 (thyroid cancer), radioactive Iodine labelled MIBG (neural crest tumors), radiolabelled peptides ( neuroendocrine tumors). 7. Positron emission tomography in oncology- clinical applications.

**Obligatory literature:** Nuclear Medicine: The Requisites, By Harvey A. Ziessman, MD, Janis P. O'Malley, MD and James Thrall

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1.

2.

**Complementary literature:**

1.

2.

**Requirements for didactic aids** (e.g. laboratory, multimedia projector, others...)

1.

2.

3.

**Conditions for obtaining a credit for the subject: Methods of evaluation-** The overall course grade will be determined by the results the final comprehensive written exam, which verifies if the student acquired the knowledge, of the information as stated in the syllabus.

## Exams

**Comprehensive Final Exam** final exam for all seminar and laboratory class topics, a multiple choice test.

### Grading scale:

90-100%	5.0 (very good)
85-89%	4.5 (better than good)
80-84%	4.0 (good)
70-79%	3.5 (quite good)
60-69%	3.0 (satisfactory)
<60%	2.0 (unsatisfactory)

**Attendance:** One absence is possible.

**Tardiness:** Students that arrive after class begins will be allowed to join the class after permission from a teacher

**Uniforms:** White lab coat

**Missed exams/Assignments/Make-up policy:** A student not present to take an assigned examination may be allowed to make-up an examination at the time determined as soon as possible by the teacher conducting the examination.

**The name and address of the department/clinic where the course is taught (module/course); contact details (phone number/ email address):**

Department of Nuclear Medicine  
Medical University of Lublin  
8c Jaczewskiego Street  
20-954 Lublin  
(+48) 81 72444339  
nuclmed@umlub.pl  
ampolak@o2.pl

**Names of the author/authors of this syllabus:**

1. ...Anna Nocuń.....
2. ....

**Names of the teacher/teachers conducting classes:**

Beata Chrapko  
Anna Nocuń  
Bogusław Stefaniak  
Katarzyna Ścibisz- Dziedzic  
Marcin Pachowicz

**Signature of the head of the department/clinic**

KIEROWNIK  
Katedry Medycyny Jądrowej i Onkologii  
Uniwersytetu Medycznego w Lublinie  
...dr hab. n. med. Beata Chrapko.....

**Dean's signature**

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**Date of submission:**