<table>
<tr><td>Name of course</td><td colspan="3">Nuclear medicine</td><td>Course code</td><td></td></tr>
<tr><td>Study programmes</td><td colspan="3">Integrated academic studies in medicine</td><td>Years of study</td><td>IV.</td></tr>
<tr><td>ECTS credit points</td><td>3</td><td>Semester</td><td>VII.</td><td>Hours per semesters (p+v+s)</td><td>30
22+5+3</td></tr>
<tr><td>Status of course:</td><td>Mandatory</td><td>Course requirements</td><td>Passed third year study exam's</td><td>Comparative conditions:</td><td>/</td></tr>
<tr><td>Participants:</td><td colspan="3">Fourth year students of Faculty of Medicine</td><td>Course schedule</td><td>according to schedule</td></tr>
<tr><td colspan="2">Head of the course:</td><td colspan="4">Assistant prof. Ivan Jurić, MD, PhD</td></tr>
<tr><td colspan="2">Contact/consultation:</td><td colspan="4">Agreed Contact</td></tr>
<tr><td colspan="2">E-mail adress and telephone number:</td><td colspan="4">vnjuric5@gmail.com ; 036 341 972
Institute of Nuclear medicine</td></tr>
<tr><td colspan="2">Assistant</td><td colspan="4">Associate prof. Ante Punda,MD,PhD
Assistant prof. Ana Barić, MD,PhD
VSS Damir Rozić,dr.med
Ivica Lovrić, chemical engineer.</td></tr>
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d_rozic@yahoo.com</td></tr>
<tr><td>Course aims:</td><td colspan="5">Students should acquire essential knowledge of nuclear medicine, principals of fundamental knowledge of radiation and nuclear medicine procedures, radiation protection including internal dosimetry for patients. The aim of this course is to provide students with knowledge on basic rules for application of open sources of ionizing radiation and diagnostic and therapeutic options of radioactive isotopes.</td></tr>
<tr><td>Expected outcome of the course: (general and specific competence skills):</td><td colspan="5">Students who complete this course successfully will know and be able to:
<u>General:</u>
• Planning to learn through the study by scientific and critical thinking.
• Demonstrate skills and personal qualities (present yourself both physically and verbally; Ability to be persuasive when interacting with colleagues).

<u>Specific:</u>
• Basic physics of Nuclear medicine
• Basic principles of radiobiology
• Principles of radiation protection</td></tr>
</table>

	• Interpretation of nuclear medicine findings (scintigram) The final grade may be a result of several intermediate results (eg. Attendance activity,) Continuous assessment can take various formes: colloquiums, self quiz at seminars and other forms active learning during practicals. Every course unit is concluded with either a written or written-oral examination. Study results are evaluated by the teacher who is the head of the course or by the commission of experts of a special range			
Course structures: course hours	Lectures:22; Seminars:3; Practices:5 .			
Plan of the course	**Lectures**	**Practices**	**Seminars**	**Independent tasks**
	Consultation	Mentoring work	Outinstitution work	Other
	Remark: Course start with lectures followed by seminars and practices.At seminars group of students gets tasks to be resolved At practice students are actively involved in activities of preparing of radiopharmaceuticals, work with gamma camera and computer connected with.			
Student obligations	Final exam; Colloquium at seminars; Attendance activity ;Students will be grading based following: • Attendance activity (seminars; practice) • Preparation course subjects at seminars • By Written exam • By Oral exam			
Student monitoring and evaluating	Attend to classes	Activities during the course	Seminars work	Practical work
	Oral exam	Written exam	Colloquium	Essay

Explanation of Grading System within the ECTS

STUDENTS' OBLIGATIONS**:**	HOURS (ASSESSMENT)	CONTRIBUTION TO ECTS POINTS	CONTRIBUTION TO EVALUATION
Practical work	12	0,5	20%
Seminars work	14	0,5	10%
Written exam	98	1	50%
Oral exam	28	1	20%

The Additional Explanation:

The examinations: Written exam; practical exam; Oral exam.

Written exam (50% of total grade)

Requirements for taking written exam: regularity of teaching attendance, seminars and practices. A candidate must pass written examinations for admission to the oral examinations. /scintigraphic interpretation/.
Validation of a written examination lasts for one year (that is current academic year).

Written exam evaluation criteria: We need to get score of 55% to passed exam.

Seminars work (10% of total grade)

Each seminar followed by oral evaluation and discussion about scintigraphic findings.

Prctical exam (20% of total grade)

Practical exam consist of interpreting 30 different types of scintigrams. Students have to recongnize some characteristic features (characteristic patterns of uptake) which can raise the suspicion and help in reaching a proper diagnosis.

Final grade:

Written exam (50%) + Seminars(10%)+ Practical exam(20%) + Oral exam (20%)

Sample Grade Cutoffs:
A = 91-100% 5 (excellent)
B = 79 to 90% 4 (very good)
C = 67 to 78% 3 (good)
D = 55 to 66% 2 (satisfactory)
F = 0 to 54% 1 (fail)

Literature: mandatory	**European Nuclear Medicine Guide** A joint publication by EANM and UEMS/EBNM Edited by: Roland Hustinx and Kristoff Muylle https://www.nucmed-guide.app/#!/home
Optional literature:	Key word Searching

Additional informations	Quality Teaching: - Student surveys - Student and teacher course evaluations - Evaluation of succeeding in exams. - Report of Quality Teaching Staff - Self-evaluation and non-institution evaluation (external quality review)

Supplement: Date of lectures

Subjects units	**SUBJECTS AND LITERATURE**
I.	Title:Basic Physics: Atomic and Nuclear Structure.Isotopes. Modes of Radioactive Decay.Radioactivity of atomic nuclei and electron layer.Interactions of Radiation with Matter.Attenuation of the radiation source,Half-life of theradionuclide. Radiation Safety
	Description: History of Nuclear medicine; Nuclear-medicine Physics
	Literature:: Mandatory and optional
II.	Title: Principles of Nuclear medicine:
	Description:Radiation Detector Performance:Ionization Detectors, Scintillation Detectors, Wellcounter's, scintillation probes and GammaCameras.Collimatores.Scintigraphy . Scintigraphic hot and cold spots. Static and dynamic study. Computer in Nuclearmedicine.SinglePhotonEmissionComputedTomography (SPECT); PositronEmissionTomography(PET); Imagefusion.
	Literature:: Mandatory and optional
III.	Title: Thyroid disease diagnosis
	Description:Radionuclide diagnosis of thyroid disease, thyroidscan, invitrotests, Thyroid ultrasound and Fine needle aspiration. Imaging of thyroid with RTG, CT and MR.
	Literature:Mandatory and optional
IV.	Title:Hypothyroidism and Hyperthyroidism
	Description: Diffuse toxic goiter,Toxic thyroid adenoma and Toxicmultinodula rgoiter.Jodbasedow.Thyrotoxicosis without hyperthyroidism. Thyroiditis: acute and subacute thyroiditis, silent thyroiditis,chronic autoimmune thyroiditis , fibrous thyroiditis. Thyroid dysfunction induced by amiodarone and interferon therapy
	Literature:: Mandatory and optional
V.	Title: Hypothyroidism
	Description:Primary, secondary and tertiary. Chronic thyroiditis and Hypothyroidism. Post-ablative hypothyroidism. Latent hypothyroidism.Hypothyroidism in pregnancy.
	Literatura:: Mandatory and optional

VI.	Title: Goiters
	Description: Diffuse and multinodula rgoiter. Functional thyroid status. Therelationshipswith surrounding structures.Endemicgoiter
	Literatura:: Mandatory and optional
VII.	Title: Thyroid tumors/benign and malignant/
	Description: Differentiated thyroid carcinomas.well-differentiated thyroid carcinoma, Poorly differentiated thyroid cancer and non-differentiated thyroid carcinoma. Thyroid microcarcinoma.Protocol for the Examination of Specimens From Patients With. Carcinomas ofthe Thyroid Gland. Treatment of patients with thyroid carcinoma. Radioiodine ablation.Follow-up of differentiated thyroid carcinoma.
	Literature: Mandatory and optional
VIII.	Title: Nuclear cardiology; nuclear pulmonology
	Description:Radiocardiography and Cardiac ventriculography. Scintigraphy myocardial infarction. Scintigraphy myocardial metabolisand Scintigraphy *of* myocardialinnervation. Radionuclide phlebography. Scintigraphic imaging for detection and localization of deep vein thrombosis.Angioscintigraphy. Bloodpool scintigraphy. Ventilation-perfusion scintigraphy.
	Literature:: Mandatory and optional
IX.	Title: Nuclear medicine in neurology and psychiatry
	Radiopharmaceuticals. Brain scintigraphy. Brain death. Radionuclide cisternography, Diagnosis of hydrocephalus, Radionuclide cisternography in diagnosis and management of cerebrospinal fluid leaks. Diagnosis of Neurodegenerative disease. Brain SPECT imaging.
	Literature:: Mandatory and optional
X.	Title: Scintigraphic Detection of Infection and Inflammation and Tumor scintigraphy
	Description:Gallium-67 (^{67}Ga) scintigraphy, J-131, J-131-MIBG. Immunoscintigraphy. Somatostatin receptor scintigraphy. Tumor markers. White blood cell scintigraphy,antigranulocyte antibodies scintigraphy,colloid scintigraphy, difosfates cintigraphy, FDG.
	Literature:: Mandatory and optional
XI.	Title: Radiation protection
	Description: Basic principles of dosimetry and radiation risk. Dosimetric units, Absorbed dose calculation. Effective and Equivalent dose. Basic principles of Radiation risk in Nuclear medicine. Biological effects of radiation on mammals. The whole body measurements of radioactivity. Health effects of radiation exposure:acute effects, Local radiation injury, Acute radiation syndrome, Chronic radiation syndrome. Medical management in case of high radiation exposure or contamination. Protection individuals exposed to source of ionizing radiation. Radiation safety regulations and standards in Nuclear medicine.
	Literature:: Mandatory and optional
XI.	Title: Gastroenterology

	Description:Hepatobiliary scintigraphy; Liver and spleen coloid scintigraphy; Liver hemangioma; Spleen scintigraphy; Gastrointestinal Bleeding Scintigraphy; Meckel's Diverticulum.Scintigraphy; Other examinations in nuclear gastroenterology; Hematology; Blood volume; The measurement of red blood cell survival; Leucocytes and platelets kinetics; Ferokinetics; Schillingo test Vitamin B12 Deficiency; Radionuclide therapy; Radioimmunotherapy of B cell non-Hodgkin's lymphoma. Radio-phosphorus therapy; Metaiodobenzylguanidine (I-131 MIBG) therapy; Radioimmunotherapy; Intracavitary radiation therapy;Palliative radiation therapy for bones; Other examinations; Lacrimal scintigraphy; Salivary gland scintigraphy; Lymphoscintigraphy.
	Literature:: Mandatory and optional
XII.	
XIII.	
XIV.	
XV.	