

WEEK 1 16 – 20.01.2016	TOPICS	ACTIVITIES	HOURS	PLACE
16.01.2016	Opening of the Course Introduction in Radiopharmacy Visit the Laboratory od Radiopharmacy	Theory Prof. E. Janevik Mr.sci. Marija Sterjova Mr.sci. P. Efremova	9.00 – 10.00 10.00 – 13.00 14.30 – 16.30	Stip
17.01.2016	Introduction to Nuclear medicine physics <ul style="list-style-type: none"> - Structure and Properties of Atoms - Radioactivity, Radiation and Radioactive Decay, Decay schemes of Radionuclides Load in Nuclear Medicine, Units of Radiation Measurement Instrumentation, measurement, calculation, dosimetry	Theory Prof. Zdenka Stojanovska Practice (group of 4-6 persons) Mr.sci. Saso Nikolovski Med.Phys. Zlatko Filipovski	9.00 – 13.00 14.00 – 17.00	Skopje
18.01.2016	Radiation protection, safety and Regulation <ul style="list-style-type: none"> - Interactions of Radiation with Matter - Instruments for Radiation Detection and Measurement - Principles of Radiation Protection - Radiation Protection - Area Monitoring (Personnel and Work Environment) Instrumentation, measurement, calculation, dosimetry	Theory Prof. Zdenka Stojanovska Practice (group of 4-6 persons) Mr.sci. Saso Nikolovski Med.Phys. Zlatko Filipovski	9.00 – 13.00 14.00 – 17.00	
19.01.2016	Holiday – organizing visit to Skopje			

20.01.2016	<ul style="list-style-type: none"> - Occupational and Non-Occupational Exposure Radiation - Radioactive Packages and Sources - Radioactive and Biohazardous Waste Disposal Methods - Radiation Safety, Radiation Accidents - Health Physics Regulations – National, EU, world-wide, IAEA standards <p>Instrumentation, measurement, calculation, dosimetry</p>	<p>Theory Dr.Sci. Marina Zdraveska-Kocovska</p> <p>Practice (group of 4-6 persons)</p> <p>Mr.sci. Saso Nikolovski Med.Phys. Zlatko Filipovski</p>	<p>9.00 – 13.00</p> <p>14.00 – 17.00</p>	
WEEK 2 23 – 27.01.2016	TOPICS	ACTIVITIES	HOURS	PLACE
23.01.2016	<ul style="list-style-type: none"> - Basic principle of pharmacy and pharmaceuticals - Basic Pharmaceutical Technology - Sterile Manufacture - Pharmaceutical microbiology - Parenteral Preparations 	<p>Theory Prof. Bistra Angelovsla Ass. Prof. Elena Drakalska</p>	<p>9.30 – 13.00</p> <p>14.30 – 16.30</p>	Stip
24.01.2016	<ul style="list-style-type: none"> - Pharmacopoeia monographs - Stability and Shelf Life - Regulations and Legal Aspects - Marketing Authorizations 	<p>Theory Prof. Bistra Angelovsla Ass. Prof. Elena Drakalska</p>	<p>9.30 – 13.00</p> <p>14.30 – 16.30</p>	Stip
25.01.2016	<ul style="list-style-type: none"> - Formulation and Packaging - Magistral preparations - Industrial radiopharmacy , hospital pharmacy - Pharmacovigilance - Introduction to Radiation Biology 	<p>Theory Prof. Bistra Angelovsla Ass. Prof. Elena Drakalska</p> <p>Ass.Prof. Katarina Smilkov</p>	<p>9.30 – 13.00</p> <p>14.30 – 16.30</p>	Stip

26.01.2016	<ul style="list-style-type: none"> - Electrochemistry of common radionuclide - In vivo kinetics of radiopharmaceuticals - Absorption, distribution, metabolism, elimination 	Theory Prof. Rubin Gulaboski Ass.Prof. Katarina Smilkov	9.00 – 13.00 14.30 – 16.30	Stip
27.01.2016	Freeze drying in the production of Radiopharmaceuticals <ul style="list-style-type: none"> - Chromatographic techniques for Quality control of freeze dried Radiopharmaceuticals - Gel filtration / HPLC 	Theory Ass.Prof. Katarina Smilkov Practice Mr.sci. Marija Sterjova Mr.sci.Paulina Efremova	9.30 – 13.00 14.30 – 16.30	Stip
WEEK 3 30.01 – 03.02.2016	TOPICS Institute of Pathophysiology and Nuclear Medicine Faculty of Medicine, Skopje	ACTIVITIES	HOURS	PLACE
30.01.2016	<ul style="list-style-type: none"> - Radiopharmaceutical preparation - SPECT radiopharmaceuticals - Generator 99mTc - Labeling of 99m Tc-radiopharmaceuticals 	Theory Practice (group of 4-6 persons)	9.00 – 12.00 13.30 – 15.30	Skopje
31.01.2016	<ul style="list-style-type: none"> - Quality Control of SPECT Radiopharmaceuticals 	Theory Practice (group of 4-6 persons)	9.00 – 12.00 13.30 – 15.30	Skopje
01.02.2016	<ul style="list-style-type: none"> - Blood cell labelling facilities and methodology 	Theory Practice (group of 4-6 persons)	9.00 – 12.00 13.30 – 15.30	Skopje

02.02.2016	- In vitro analysis using radioisotope – RIA, IRMA	Theory Practice (group of 4-6 persons)	9.00 – 12.00 13.30 – 15.30	Skopje
03.02.2016	- Clinical application of SPECT radiopharmaceuticals	Theory Practice (group of 4-6 persons)	9.00 – 12.00 13.30 – 15.30	Skopje
WEEK 4 06-10.02.2016	TOPICS	ACTIVITIES	HOURS	PLACE
06.02.2016	Operation of a GMP facility Principle of GMP and facility design (planning and validation) Inspections, experiences Industrial Manufacturing including FDG production	Theory Prof. Emilija Janevik Practice (group of 4-6 persons) Mr.sci. Marija Atanasova Mr.sci. Katerina Kolevska Mr. Maja Velickovska Mr.sci. Filip Jolevski	9.00 – 12.00 13.30 – 16.30	Skopje
07.02.2016	Good Radiopharmaceutical Practices – Regulation Aspects - Hospital Radiopharmacy - PET Radiopharmacy Quality assurance and quality management systems (including documentations)	Theory Prof. Emilija Janevik Ass. Prof. Aleksandar Cvetkovski	9.00 – 13.00 14.00 – 17.00	Skopje
08.02.2016	Quality control of radiopharmaceuticals – general aspects	Theory Prof. Zorica Arsova-Sarainovska Practice	9.00 – 13.00 14.30 – 16.30	Skopje

		(group of 4-6 persons) Mr. Maja Velickovska Mr.sci. Filip Jolevski		
09.02.2016	Quality control of radiopharmaceuticals <ul style="list-style-type: none"> - Radionuclidic purity - Radiochemical purity - be able to determine amount of radiochemical impurities - Thin layer chromatography, Solvent extraction, Column chromatography - low pressure and HPLC, Precipitation with filtration or centrifugation - Pharmaceutical purity – pH, Visual inspection, Chemical tests, Cell viability, Antigen excess 	Theory Prof. Zorica Arsova-Sarainovska Practice (group of 4-6 persons) Mr. Maja Velickovska Mr.sci. Filip Jolevski	9.00 – 13.00 14.30 – 16.30	Skopje
10.02.2016	Quality control of radiopharmaceuticals <ul style="list-style-type: none"> - Equipment Tests - proper operation of laminar airflow hoods, exhaust hoods, centrifuges and balances through standard in house or independent laboratory test methods Good Laboratory Practice	Theory Prof. Zorica Arsova-Sarainovska Prof. Biljana Gjorgjeska	9.00 – 13.00 14.30 – 16.30	Skopje
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WEEK 5 13-17.02.2016	TOPICS	ACTIVITIES	HOURS	PLACE
13.02.2016	PET radioisotope production and radiopharmaceutical preparation <ul style="list-style-type: none"> - cyclotron produced radioisotopes PET radioisotope production(F-18/C-11/N-13) PET Radiopharmaceutical Preparations (F-18/C-11/N-13) Quality control of Fluorine-18 radiopharmaceuticals Quality control of Carbon - 11 radiopharmaceuticals Quality control of Nitrogen-13 radiopharmaceuticals	Theory Dr.sci. Marina Zdraveska-Kocovska Med. Phys. Zlatko Filipovski Practice (group of 4-6 persons) Mr.sci. Saso Nikolovski Med.Phys. Zlatko Filipovski	9.00 – 12.00 13.30 – 16.30	Skopje

	Quality control of Ga-68 radiopharmaceuticals	Mr.sci. Marija Atanasova Mr.sci. Katerina Kolevska Mr. Maja Velickovska Mr.sci. Filip Jolevski		
14.02.2016	PET radioisotope production and radiopharmaceutical preparation - Syntesis, production, dispensing, distribution operational level 3b PET radioisotope production(F-18/C-11/N-13) PET Radiopharmaceutical Preparations (F-18/C-11/N-13) Quaity control of Fluorine-18 radiopharmaceuticals Quaity control of Carbon - 11 radiopharmaceuticals Quaity control of Nitrogen-13 radiopharmaceuticals Quaity control of Ga-68 radiopharmaceuticals	Theory Prof. Dmitry Soloviev Practice (group of 4-6 persons) Mr.sci. Saso Nikolovski Med.Phys. Zlatko Filipovski Mr.sci. Marija Atanasova Mr.sci. Katerina Kolevska Mr. Maja Velickovska Mr.sci. Filip Jolevski	9.00 – 13.00 14.30 – 16.30	Skopje
15.02.2016	PET radioisotope production and radiopharmaceutical preparation - F18 radiopharmaceuticals - syntesis, production, dispensing, distribution PET radioisotope production(F-18/C-11/N-13) PET Radiopharmaceutical Preparations (F-18/C-11/N-13) Quaity control of Fluorine-18 radiopharmaceuticals Quaity control of Carbon - 11 radiopharmaceuticals Quaity control of Nitrogen-13 radiopharmaceuticals Quaity control of Ga-68 radiopharmaceuticals	Theory Prof. Dmitry Soloviev Practice (group of 4-6 persons) Mr.sci. Saso Nikolovski Med.Phys. Zlatko Filipovski Mr.sci. Marija Atanasova Mr.sci. Katerina Kolevska Mr. Maja Velickovska Mr.sci. Filip Jolevski	9.00 – 13.00 14.30 – 16.30	Skopje
16.02.2016	PET radioisotope production and radiopharmaceutical preparation - C-11 radiopharmaceuticals - syntesis, production, dispensing, distribution PET radioisotope production(F-18/C-11/N-13)	Theory Prof. Dmitry Soloviev Practice	9.00 – 13.00 14.30 – 16.30	Skopje

	PET Radiopharmaceutical Preparations (F-18/C-11/N-13) Quaity control of Fluorine-18 radiopharmaceuticals Quaity control of Carbon - 11 radiopharmaceuticals Quaity control of Nitrogen-13 radiopharmaceuticals Quaity control of Ga-68 radiopharmaceuticals	(group of 4-6 persons) Mr.sci. Saso Nikolovski Med.Phys. Zlatko Filipovski Mr.sci. Marija Atanasova Mr.sci. Katerina Kolevska Mr. Maja Velickovska Mr.sci. Filip Jolevski		
17.02.2016	PET radioisotope production and radiopharmaceutical preparation - N-13 radiopharmaceuticals - syntesis, production, dispensing, distribution PET radioisotope production(F-18/C-11/N-13) PET Radiopharmaceutical Preparations (F-18/C-11/N-13) Quaity control of Fluorine-18 radiopharmaceuticals Quaity control of Carbon - 11 radiopharmaceuticals Quaity control of Nitrogen-13 radiopharmaceuticals Quaity control of Ga-68 radiopharmaceuticals	Theory Prof. Dmitry Soloviev Practice (group of 4-6 persons) Mr.sci. Saso Nikolovski Med.Phys. Zlatko Filipovski Mr.sci. Marija Atanasova Mr.sci. Katerina Kolevska Mr. Maja Velickovska Mr.sci. Filip Jolevski	9.00 – 13.00 14.30 – 16.30	Skopje
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WEEK 6 20-24.02.2016	TOPICS	ACTIVITIES	HOURS	PLACE
20.02.2016	PET radioisotope production and radiopharmaceutical preparation - Quality Assurance; - Quality Management System; - Risk assessment PET radioisotope production(F-18/C-11/N-13) PET Radiopharmaceutical Preparations (F-18/C-11/N-13) Quaity control of Fluorine-18 radiopharmaceuticals Quaity control of Carbon - 11 radiopharmaceuticals	Theory Prof. Dmitry Soloviev Practice (group of 4-6 persons) Mr.sci. Saso Nikolovski	9.00 – 12.00 13.30 – 16.30	Skopje

	Quaity control of Nitrogen-13 radiopharmaceuticals	Med.Phys. Zlatko Filipovski Mr.sci. Marija Atanasova Mr.sci. Katerina Kolevska Mr. Maja Velickovska Mr.sci. Filip Jolevski		
21.02.2016	PET radioisotope production and radiopharmaceutical preparation - Cu-64 radiopharmaceuticals - syntesis, production, dispensing, distribution PET radioisotope production(F-18/C-11/N-13) PET Radiopharmaceutical Preparations (F-18/C-11/N-13) Quaity control of Fluorine-18 radiopharmaceuticals Quaity control of Carbon - 11 radiopharmaceuticals Quaity control of Nitrogen-13 radiopharmaceuticals	Theory Prof. Dmitry Soloviev Practice (group of 4-6 persons) Mr.sci. Saso Nikolovski Med.Phys. Zlatko Filipovski Mr.sci. Marija Atanasova Mr.sci. Katerina Kolevska Mr. Maja Velickovska Mr.sci. Filip Jolevski	9.00 – 13.00 14.30 – 16.30	Skopje
22.02.2016	PET radioisotope production and radiopharmaceutical preparation - Cu-64 radiopharmaceuticals - syntesis, production, dispensing, distribution PET radioisotope production(F-18/C-11/N-13) PET Radiopharmaceutical Preparations (F-18/C-11/N-13) Quaity control of Fluorine-18 radiopharmaceuticals Quaity control of Carbon - 11 radiopharmaceuticals Quaity control of Nitrogen-13 radiopharmaceuticals	Theory Prof. Adriano Duatti Practice (group of 4-6 persons) Mr.sci. Saso Nikolovski Med.Phys. Zlatko Filipovski Mr.sci. Marija Atanasova Mr.sci. Katerina Kolevska Mr. Maja Velickovska Mr.sci. Filip Jolevski	9.00 – 13.00 14.30 – 16.30	Skopje
23.02.2016	PET radioisotope production and radiopharmaceutical preparation High Energy Cyclotrons PET radioisotope production(F-18/C-11/N-13)	Theory Prof. Prof. Adriano Duatti	9.00 – 13.00 14.30 – 16.30	Skopje

	PET Radiopharmaceutical Preparations (F-18/C-11/N-13) Quaity control of Fluorine-18 radiopharmaceuticals Quaity control of Carbon - 11 radiopharmaceuticals Quaity control of Nitrogen-13 radiopharmaceuticals	Practice (group of 4-6 persons) Mr.sci. Saso Nikolovski Med.Phys. Zlatko Filipovski Mr.sci. Marija Atanasova Mr.sci. Katerina Kolevska Mr. Maja Velickovska Mr.sci. Filip Jolevski		
24.02.2016	Overview of radiopharmaceuticals for therapy	Theory Prof. Adriano Duatti Practice (group of 4-6 persons) Mr.sci. Saso Nikolovski Med.Phys. Zlatko Filipovski Mr.sci. Marija Atanasova Mr.sci. Katerina Kolevska Mr. Maja Velickovska Mr.sci. Filip Jolevski	9.00 – 13.00 14.30 – 16.30	Skopje
WEEK 7 27.02- 03.03.2016	TOPICS	ACTIVITIES	HOURS	PLACE
27.02.2016	Theranostic Radiopharmaceuticals Clinical application of PET Radiopharmaceuticals	Theory Prof. Emilija Janevik Practice (group of 4-6 persons)	9.00 – 13.00 14.30 – 16.30	Skopje

		Dr. Meri Angeleska Dr. Jasmina Simjanovska Dr. Dusica Todorova Dr. Slavko Tasevski		
28.02.2016	Kit manufacturing for in-house, in-country and Global use Clinical application of PET Radiopharmaceuticals	Theory Prof. Emilija Janevik Practice (group of 4-6 persons) Dr. Meri Angeleska Dr. Jasmina Simjanovska Dr. Dusica Todorova Dr. Slavko Tasevski	9.00 – 13.00 14.30 – 16.30	Skopje
01.03.2016	Introduction of importance to use animal models in the research Basic anatomy of animals used in research Visit to the animal house - Faculty of Natural Science and Mathematics	Theory Dr.sci. Francesca Ravanetti Prof. Luisa Ragioneri Prof. Icko Gjorgoski	9.00 – 11.00 11.00 – 13.00 14.00 – 17.00	Skopje
02.03.2016	Basic anatomy of rodents (Recognize the anatomical structures) Histological analyses and labeling techniques to label and identify structures of different animal tissue. Introducing animal models in preclinical investigation of new radiopharmaceuticals	Theory Prof. Luisa Ragioneri Dr.sci. Francesca Ravanetti Prof. Emilija Janevik	9.00 – 11.00 11.00 – 13.00 14.30 – 16.30	Skopje
03.03.2016	Radiation Dosimetry in Nuclear Medicine	Theory Dr.sci. Marina Zdraveska Kocovska Mr.sci Saso Nikolovski	9.00 – 13.00	Skopje

	Radiation Dosimetry in Nuclear Medicine – instrumentation	<p>Practice (group of 4-6 persons)</p> <p>Dr.sci. Marina Zdraveska Kocovska Mr.sci. Saso Nikolovski Med.Phys. Zlatko Filipovski</p>	14.30 – 16.30	
WEEK 7 06-10.03.2016	TOPICS	ACTIVITIES	HOURS	PLACE
06.03.2016	<p>Clinical application of PET Radiopharmaceuticals in Oncology</p> <p>Clinical application of PET Radiopharmaceuticals</p>	<p>Theory Dr. Meri Angeleska</p> <p>Practice (group of 4-6 persons)</p> <p>Dr. Meri Angeleska Dr. Jasmina Simjanovska Dr. Dusica Todorova Dr. Slavko Tasevski</p>	<p>9.00 – 12.00</p> <p>13.30 – 16.30</p>	Skopje
07.03.2016	<p>Clinical application of PET Radiopharmaceuticals in non-oncological diseases</p> <p>Clinical application of PET Radiopharmaceuticals</p>	<p>Theory Dr. Meri Angeleska</p> <p>Practice (group of 4-6 persons)</p> <p>Dr. Meri Angeleska Dr. Jasmina Simjanovska Dr. Dusica Todorova Dr. Slavko Tasevski</p>	<p>9.00 – 13.00</p> <p>14.30 – 16.30</p>	Skopje
08.03.2016	Regulatory aspects of Radiopharmaceuticals	<p>Theory Dr.sci. Marija Darkovska</p>	9.00 – 13.00	Skopje

	Exercise – dose calculation	Serafimovska Practice (group of 4-6 persons) Mr.sci. Marija Atanasova Mr.sci. Katerina Kolevska Mr. Maja Velickovska Mr.sci. Filip Jolevski	14.00 – 17.00	
09.03.2016	Regulatory aspects of Radiopharmaceuticals Visit to the Agency of Drug of Republic of Macedonia - MALMED	Dr.sci. Marija Darkovska Serafimovska	9.00 – 13.00	Skopje
10.03.2016	Self-study Test, assessment Certification and closing		9.00 – 13.00 14.30 – 16.30	Skopje