PROGRAMME FRAMEORK

Detailed course contents and laboratory activities:
Estimated numer of hours dedicated to each topic (lessons/tutorship/exercises/tests&quizzes)

	TITLE/TOPICS	HOURS	LECTURE/EXERCISE
Block I	**NORM and radon body of knowledge**	**20**	
1	A set of accepted and agreed upon standards and nomenclatures pertaining to the field of NORM and related activities : definitions and terminology, natural radionuclides importance and sources of NORM, sequential decay and disequilibrium in natural decay series, differences between NORM and TENORM; NORM vs. natural background, HBRA (high background radiation area)	3	L
2	Legal context of NORM - radiation protection and mutual interconnections with regulation dealing with non-radioactive waste, features of occupational exposure, protection of environment in the light of recent ICRP recommendations, clearance and exemption levels, liquid NORM, authority control - notification, graded approach	2	L
3	Typical scenarios of environmental exposure caused by (NORM liquid, gaseous and solid NORM) and Natural Radionuclides migration in environment, radionuclides fractionation, fragmented decay series	2	L
4	Radon isotopes - sources and migration in human environment, exposure scenarios, decay product and derive effective dose evaluation	2	L
5	NORM affected legacy sites characterisation	1	L
6	NORM survey - dedicated to naturally occurring radioactive materials (NORM), with the main objective of gathering specific valuable information on various NORM topics from regulators, operators and potentially other stakeholders across Europe	1	L

7	NORM survey – filling in the online form (EUSurvey) and discussion	3	E
8	The systematic approach to identification of NORM involving industries and processes – four tiers method -mineral resources classification and modification of European waste catalogue	2	L
9	Multiple choice test and discussion	1	E
10	Preparation of a country specific NORM inventory – group exercise	3	E
Block II	**Occupational exposure and exposure of members of the public caused by NORM**	**12**	
1	External exposure: identification of exposure sources and typical exposure scenarios for members of the public and in NORM involving industries, identification of most sensitive groups	2	L
2	Intake and internal exposure - important natural radionuclides, commited effective dose, uranium and thorium vs their decay product	2	L
3	Exposure to radon and radioactive aerosols and decay products fractions: identification of exposure sources and typical exposure scenarios for members of the public and in NORM involving industries, identification of most sensitive groups	2	L
4	Dose evaluation and workplaces/workers classification - graded approach to occupational exposure monitoring and evaluation, work places classification and reporting, communication	1	L
5	Multiple choice test and discussion	2	E
6	Effective dose evalution – group exercise	3	E

Block III	**Special considerations of NORM**	**5**	
1	NORM in building materials	2	L
2	Naturally occurring radionuclides (NOR) in drinking water	2	L
3	Committed dose calculation cause by intake via water consumption derived radionuclides activity concetration limits – individual exercise	1	E
Block IV	**NORM and radon monitoring rudiments**	**10**	
1	Crucial radionuclides identification, measurement technique selection, interpretation of results obtained in the light of sequential decay, disequilibrium in natural decay series, natural background subtraction.	2	L
2	Overview of laboratory and field measurements methods	2	L
3	Dosimetry - applied measurement techniques and measurement strategies	2	L
4	Introduction to Radon and RP measurement, free fraction and aerosols	2	L
5	Monitoring and sampling strategies - identification of sampling units, preparation sampling plan, data interpolation/evaluation	2	L

Block VI	**Exercises - application of gathered knowledge - real example evaluation an proposed solutions discussion**	**13**	
1	A company reprocessing NORM residues (tin and lead re-melting processes)	3	E
2	Natural lake contaminated by radium rich brines	3	E
3	A metal ore mine	3	E
4	Examples of practical solutions applied in cases of planned and existing exposure situations monitoring based on coal mining - exposure to NORM and radon/radon progeny	4	E3/L1
	in total	**60**	