



Sevastopol National University of Nuclear Energy and Industry

**Masters training on speciality
8.04010605 «Radioecology»**

**Specialization “Human and Environmental Security on Territories
Contaminated by Radioactive Agents”**

2013

Training Masters on speciality 8.04010605 “Radioecology”. Specialization: “Human and Environmental Security on the territories contaminated by radioactive agents”. – Sevastopol National University of Nuclear Energy and Industry, 2013. – 54P.

Compilers

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The main information about Ecologist Training in Sevastopol National University of Nuclear Energy and Industry is given. Curriculum for Training Masters on specialty “Radioecology”, specialization: “Human and Environmental Safety on the territories contaminated by radioactive agents” is provided. Comparative characteristics of Curriculum for training Masters on specialty 8.04010605 “Radioecology” (2013) and Curriculum for Training Masters on specialty “Ecology and Environment Protection” (2008 year) is done. The changes in the new Curriculum which were done after studying the experience of European Universities-partners and considering interdisciplinary approach for training Masters were described. The Syllabuses include some sections which realize objectives of the project 530644-TEMPUS-1-2012-1-ES-Tempus-JPCR “Human Security (environment, quality of food, public health and society) on the territories Contaminated by Radioactive Agents”. The list of general requirements as for the competencies of specialists is shown.

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“MANIFESTO” Template for the Master degree

COVER: University name

- Sevastopol National University of Nuclear Energy and Industry (SNUNEI)

Name of the degree, academic year

- Master of radioecology. 1 year base.

MAIN FORMATION OBJECTIVES OF THE DEGREE

The students obtaining the degree in “Master of radioecology” will have:

- solid knowledge of radioecology, radiochemistry, toxicology, methods of rehabilitation, radiation biochemistry, radioecological monitoring
- deep knowledge of Instruments and methods of radioecological control, techniques for data analysis and visualization
- Knowledge about application of the scientific method of investigation

SPECIFIC OBJECTIVES OF THE DEGREE

- Master graduate will be able to work in state and private companies, analytical consulting centres, divisions of Ministry of nature protection, nuclear facilities and enterprises.
- Master graduate will possess the capability of working with instrumentations and technologies concerning radiocontrol, radiomonitoring and analyses.
- Master graduate will be able to use English as a working language, for working in an International context.
- Understand the problems linked to measurements and evaluation in radioprotection - Theoretical bases of nuclear physics, physics of radiations, functioning of main instruments, how to use them correctly – evaluation of dosimetry, in comparison with limits and legislation.

EXPECTED RESULTS (Dublin descriptors)

Knowledge and understanding:

- Gaining of knowledge and its understanding via lectures; seminars; individual work;
- Assessment will be carried out through regular tests for students, semester exams, final written and oral exams.

Applying knowledge and understanding:

- Execution of the laboratory works and active participation in seminars.
- Teaching of the gained knowledge to the students of the first years in the frames of the pedagogical practical placement.
- Carrying out the research and field work.
- Practical placement in the companies, enterprises, industry.
- Assessment will be carried out through regular reporting to the supervisor on diploma thesis preparation, feedbacks from the Bachelor students upon the teaching by Master students (how effective the material was presented), search of relevant bibliography, defence of the Diploma thesis, exams.

Making judgements:

- The capability of the student to perform activities in autonomy will be assessed during the exams;
- Going through the stages of the diploma thesis preparation;
- Having the experimental internship for the preparation of the thesis.

Communication skills:

- Students’ participation in conferences and workshops;

- Making presentations in the course of studying;
- Presentations in the frames of the conferences, master thesis defence;
- Pedagogical practice (teaching to Bachelor students);
- Students' summer schools, workshops, seminars, discussions, brainstorming meetings;
- Communication with the field specialists during the practical placement in industry;
- Assessment will be carried out through exams (oral and written), Diploma defence (presentation of research work carried out), practical placement in industry.

Learning skills:

- All the educational process during the Master course, particularly diploma thesis development and periodic research work contributes to the development of learning skills for the future self-directed work;
- Throughout the study period the student will learn how to access sources for information on books, texts, libraries, internet resources.

POSSIBLE WORK PERSPECTIVES

- Master graduate will be able to work in work in state and private companies, analytical consulting centres, divisions of Ministry of nature protection.
- Master graduate will be able to work at nuclear facilities and enterprises.

REQUIREMENTS FOR ACCESS TO THE DEGREE

Admission to the Degree requires 4 years bachelor degree in scientific disciplines. Students must take test based on knowledge of disciplines with a radioecology slope. Students transferred from other Universities must to have a diploma on Faculty of Natural Sciences and to hand over preliminary examination on general grounds.

CURRICULUM OF STUDIES

Mandatory modules:

- Professionally oriented socio-economic training
- Occupational health – Civil protection – Methodology of scientific research Scientific, professional, practical training
- Radioecology – Radiation monitoring – Radiation safety – Remediation of areas contaminated
- Practicals and thesis

Selective modules:

Disciplines for self-choice:

- Geographical Information Systems
- Radioanalytical techniques
- Business foreign language
- Higher education and Bologna process
- Intellectual property

Free choice:

- Biological effects of ionizing radiation
- Radiation sources
- Legal aspects of radiology
- Radionuclide pollution and safety

INFORMATION ON THESIS AND FINAL EXAMINATION

Committee for the final examination: 6 with a graduate degree nominated by the Rector.

Periods for the examination: June.

Length of presentation: 15 minutes.

Language of presentation: Ukrainian or Russian.

General characteristics of training ecologists in SNUNEI

- 1996 year Started Bachelors training, direction 6.040106 “Ecology, Environment Protection and Balanced Environmental Management”, educational qualification 3439 «Environmental manager»
Duration of training 4 years – 240 credits ECTS
- 2003 year Started specialists and masters training on speciality 7/8.04010601 “Ecology and environment protection”. Qualification 2149.2 “Safe Environment Engineer”
Duration of training: 1 year– 60 credits ECTS
- 2013 year Masters training is divided into 2 specialities:
- Speciality 8.04010601 “Ecology and environment protection”, educational qualification 2211.2 “Ecologist”, 2310.2 “The teacher of higher educational institution”
 - Speciality 8.04010605 “Radioecology”, educational qualification 2111.2 “Radiology engineer”
 - Duration of training: 1 year– 60 credits ECTS

Distribution of educational and professional programs content according to the total volume and to the cycles of Master training, specialty 8.04010605 "Radioecology"

Training cycles	Total hours	ECTS credits	% of the total training time
The cycle of professionally oriented humanitarian and socio-economic training, Total:	216	6,0	10,0
The cycle of natural-scientific, professional and practical training, Total:	1188	33,0	55,0
including:			
- subjects	486	13,5	22,5
- pre-degree practice	216	6,0	10,0
- graduation projects	486	13,5	22,5
Total hours at the statutory part, Total:	1404	39,0	65,0
The cycle of subjects selected by the university. Total:	540	15,0	25,0
The cycle of subjects selected by students. Total:	216	6,0	10,0
The total amount of hours for the selective part:	756	21,0	35,0
TOTAL FOR MASTER TRAINING:	2160	60,0	100,0



MINISTRY OF ENERGY AND COAL INDUSTRY OF UKRAINE

SEVASTOPOL NATIONAL UNIVERSITY OF NUCLEAR ENERGY AND INDUSTRY

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CURRICULUM

of training EQL «Master» of the field of knowledge 0401 «Natural sciences»
towards 6.040106 «Ecology, environmental protection and balanced
use of nature»
Form of study: daily

Qualification: - 2111.2 "Engineer-Radioecologist"
Study period: - 1 year

I. Schedule of the learning process

Year	September		October		November		December		January		February		March		April		May		June		July		August																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	
5	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	C	C	Pr	Pr	Pr	Pr	Pr	Pr	Pr	Pr	Pr	M	M	M	M	M	M	M	M	M	M	M	M	Mp	Mp												

Symbols: T theoretical training C exams K vacation Pr practice M writing diploma Дe passing the state exam Mp protection of master project

II. Summary data on the time budget

Year	Theoretical training	Exams	Practice	State certification	Diploma project performance	Vacation	Altogether
	The number of rows is determined by the number of courses						
5	22	2	7	2	8	2	43
Altogether	22	2	7	2	8	2	43

III. Practice

Name of practice	Semester	Weeks
Pre-diploma practice	10	4
Scientific and Production Practice	10	5

III. State certification

Name of the course	Form of state certification (exam, diploma project)	Semester
	Master work	10

**Comparison of curricula for Master
specialty "Ecology and Environment Protection" (2008)
and specialty "Radioecology" (2013)**

2008		2013		Changes in curricula and inter-disciplinary approach
Subjects	ECTS	Subjects	ECTS	
I. Theoretical training				
1. Compulsory courses				
1.1. Professionally oriented, humanitarian and socio-economic training part				
Occupational health in the field	1,5	Occupational health in the field	1	Reduction of credits by 0,5
Civil protection	1,5	Civil protection	1	Reduction of credits by 0,5
		Sustainable Development Strategy	2	Shifted from the cycle 1.2 into the cycle 1.1 <i>3 modules are included "Human Security and Society":</i> 1. International and national documents, legal acts which takes into account principles of socio-economic systems 2. Environmental Policy and Alternative Technologies 3. Strategies of local sustainable development, their monitoring; scenarios and plans forecast based on the consumption of the available environment-friendly products
Methodology and organization of scientific research	3	Methodology and organization of scientific research in Radioecology	2	Reduction of credits by 1,0
Pedagogy and Psychology in higher education	1,5			Excluded
Total for the part	9	Total for the part	6	The total cycle reduced to 2 credits in favor of professional disciplines
1.2. Natural science subjects and practical training part				
Sustainable Development Strategy	3	Radioecology (by fields)	4.5	A new subject is added <i>8 modules are added "Human Security and Environment":</i>

				<ol style="list-style-type: none"> 1. Scientific basis of Radiology and stages of development 2. Current radiation situation in Ukraine and radiological consequences of the Chernobyl accident 3. Methodological principles, basic principles and concepts of modern radioecological research 4. Radioecology of forest ecosystems 5. Radioecology of aquatic ecosystems 6. Migration of radionuclides in open and mountainous landscapes 7. The behavior of radionuclides in agrocenosis 8. Character of the radionuclides transfer, their distribution and redistribution in urban systems <p><i>1 module is added "Quality of Food and Human Security":</i> Migration of radionuclides to humans through a food chain</p>
System Analysis of Environmental Quality	3	Radiation Safety and Handling RW	3	<p>A new subject is added</p> <p><i>3 modules are added "Public Health and Human Security":</i></p> <ol style="list-style-type: none"> 1. Norms and principles of radiation safety 2. Radiation Safety organization of a territory, a facility, of staff and public 3. Management decisions and organizational measures to ensure radiation safety
Environmental Management and Auditing	3	Radiation monitoring	3	<p>A new subject is added</p> <p><i>2 modules are added "Quality of Food and Human Security":</i></p> <ol style="list-style-type: none"> 1. Dosimetric and radiometric equipment 2. Sampling, and database formation and processing
		Rehabilitation of areas contaminated with radionuclides	3	<p>A new discipline is put, the following modules were included:</p> <p><i>1 module is added "Human Security and Environment":</i></p>

				Environmental rehabilitation of natural ecosystems, of agrocenosis and of the Chernobyl zone <i>3 modules are added "Quality of Food and Human Security":</i> 1. Optimization of nature use on contaminated territories 2. Countermeasures to prevent and reduce contamination of agriculture, fishery and forestry products 3. Technological processing and recycling of products contaminated by radionuclides
Total for the part	9	Total for the part	13,5	The total for the part is increased by 4,5 credits
Total for the compulsory part of theoretical training	18	Total for the compulsory part of theoretical training	19,5	The total for the compulsory part is increased by 1,5 credits
2. Selective courses				
2.1. Training courses selected by the University				
Information Technology	3	Geographic information systems in RE	3	<i>Were included 2 modules "Using GIS technology in radiation monitoring":</i> 1. Use of application of GIS technology and mathematical models to predict situations and acceptance of administrative decisions for rehabilitating areas contaminated with radionuclides; 2. Tehnolohiya creation of thematic maps in GIS MapInfoProfessional
Energy-saving and low-waste technologies	3	Fundamentals of radioanalytical techniques in Radioecology	3	A new discipline is added
		Higher education of Ukraine and the Bologna Process	3	Moved from compulsory course to a selective
		Business foreign language	3,5	A new discipline is added
		Legal training in higher education	1,5	A new discipline is added
Geographic information systems in Ecology	2			Total variable of theoretical training at the option of the institution was increased by 6 credits
Total for the part	9	Total for the part	15	

2.2. Training courses selected by the student				
Block 1				
Ecological standardization and certification	2	Biological effects of ionizing radiation	3	A new discipline is added. The number of credits increased by 1
International ecological law	1	Radiation sources and assess of their impact on the environment	3	A new discipline is added. The number of credits increased by 2
Block 2				
Ecosystem theory	2	Legal aspects of Radioecology	3	A new discipline is added. The number of credits increased by 1
Environmental inspection	1	Radionuclide pollution and radiation safety of the population	3	A new discipline is added. The number of credits increased by 2
Total for the part (student selects 1 block)	3	Total for the part (student selects 2 out of all suggested disciplines)	6	The total for the selective part of theoretical training (selected by students) is increased by 3 credits
Total for the elective part of theoretical training	12	Total for the elective part of theoretical training	21	The total for the selective part of theoretical training is increased by 9 credits
Total for the theoretical part	30		40,5	The total for theoretical training is increased by 10,5 credits
II. Practical training				
Research and teaching practice	6	Pre-diploma practice	6	The focus is brought into professionally-oriented practice
Preparation of master's thesis	24	Diploma planning	13,5	The number of credits is reduced
Total for practical training	30	Total for practical training	19,5	Total for practical training is reduced by reducing credits for diploma writing (reduced by 10,5 credits and added to professional training).
Total for Master's Training: 60 ECTS credits				

Changes in the curriculum

Changes	Results
1. the schedule of the training	Reducing the credits for writing diploma project the total number of hours for theoretical training (both lessons and independent work) increased from 30 credits to 40,5. Thus, the total number of hours for academic subjects increased from 13 to 18 (№ 15, 16 in two blocks).
2. correlation between training cycles	<p>The total number of hours for academic subjects of professionally oriented humanitarian and socio-economic training was reduced from 9 to 6 credits.</p> <p>The total number of hours for academic subjects of natural-scientific, professional and practical training increased from 9 to 13,5 credits.</p> <p>The total number of hours for the selective part of theoretical training increased from 9 to 15 credits.</p>
3. changes in the theoretical training	<p>The worked out Curriculum contains 8 new academic subjects; 4 subjects are excluded and 9 subjects are taken from the previous curriculum.</p> <p>The number of credits for separate subjects is changed.</p>
4. changes in the practical training	Research and pedagogical practice is replaced by pre-degree professionally oriented practice.

Realization of the interdisciplinary approach

- The total for masters training is 60 credits ECTS; according the educational program 40,5 credits ECTS (67,5%) are subjects for theoretical training (lessons, independent work and exams). The total number of subjects in the curriculum is 18, which consists of 81 modules.
- Subjects which show the objectives of the project are 18,5 credits ECTS. It is 30,8% of the Curriculum credits and 45,7% of the subjects' credits.
- 6 subjects (35% of total number of subjects) respond to the objectives of the project. These 6 subjects consist of 37 modules.
- 25 modules (68%) of 37 modules of these 6 subjects realize the tasks of the project.

Syllabus

(*abilities and modules that respond to the project objectives are in *bold*)

1. OCCUPATIONAL HEALTH IN THE FIELD

Credits ECTS: 1

Total hours: 36

Form of control: module test

Term: 1

Learning objectives:

- ability to apply methods for radiation situation assessment using radiometric and dosimetric devices of different systems;
- ability to provide the required level of labor safety and personal security in the case of radiation hazardous situations;
- ability to apply means to prevent radiation damage and to provide first aid in emergency situations;
- ability to apply ionizing radiation diagnostic techniques and skills to use devices of individual and total radiation monitoring.

Teaching activities:

Lectures – 6 hours

Practical lessons – 6 hours

Short content:

Safety management in the industry and science institutions:

- International and national standards on occupational safety
- Safety of technological processes and of equipment
- Certification of jobs and injury prevention

Literature:

1. Житецький В.П.. Основи охорони праці: Навчальний посібник –Львів,2001.-72с
2. Бескrestнов Н.В. Охрана труда на атомних станциях : Учебное пособие- Москва ,1989.-120с.
3. Купчик М.В та інші. Основи охорони праці: Навчальний посібник –Київ, 2000.-92с.

Additional literature:

- 1.Вінокурова Л.Е. Основи охорони праці: Лабораторний практикум-Київ,2001-68с.
- 2.Типовое положение о порядке расследования и ведения учета несчастных случаев, профессиональных заболеваний и аварий на производстве, Київ,2001-54с.

2. CIVIL PROTECTION

Credits ECTS: 1

Total hours: 36

Form of control: final test-credit

Term: 1

Learning objectives:

- knowledge of the ways and means of protection against damaging factors of accidents, natural disasters and modern weapons of mass destruction;
- knowledge of the purpose and procedure of the units of radiation, chemical reconnaissance and radiation monitoring;
- knowledge of methods of predicting potential radiological, chemical, bacteriological (biological) environment, which may occur as a result of natural disasters and accidents;
- knowledge of and skills farming in man-polluted and disturbed areas;
- ability according to the future profession assess the sustainability of commercial facilities in emergency situations and determine the necessary steps to enhance their sustainability;
- ability to organize and carry out emergency and reconstruction work on energy networks to allow rescue operations and functioning of the population and agriculture

Teaching activities:

Lectures – 6 hours

Practical lessons – 6 hours

Short content:

Population and territory protection from the emergency situations of anthropogenic and natural character:

- Planning of measures, situation forecasting, organization of the emergency and salvage operations, support measures and actions within a uniform system of civil protection
- Assessment of a Facility readiness to function in emergency situations and principles of its implementation
- Means, methods of analysis, principles of assessment, classification and monitoring of emergency

Literature:

1. Стеблюк М.Г. Цивільна оборона. Підручник. – К: «Знання-прес», 2003 – 456 с.
2. Фендриков И.В. Гражданская оборона : Курс лекций. Учебное пособие – Севастополь СНУЯЭиП, 2010 -208с.
3. ДСТУ Б А.2.2-7:2010. Проектування. Розділ інженерно-технічних заходів цивільного захисту (цивільної оборони) у складі проектної документації об'єктів. – Київ: Мінрегіонбуд. України, 2010.

3. SUSTAINABLE DEVELOPMENT STRATEGY

Credits ECTS: 2

Total hours: 72

Form of control: final test-credit with the assessment

Term: 1

Learning objectives:

- knowledge of the basic dynamics' regularities of open systems, the relationship between the factors of sustainable development;
- ability to use indicators of sustainable development to confirm decisions related to the development of socio-economic systems at global and regional levels;
- skills to use sustainable development indicators to assess environmental risks of economic development perspectives in the region;
- ability to analyze and predict the social aspects of environmental policy;
- ability to use the principles of sustainable development in the professional activities.

Teaching activities:

Lectures – 12 hours

Practical lessons – 12 hours

Short content:

Theoretical principles of sustainable development:

- The concept of system and development
- International and national documents, legal acts which takes into account principles of socio-economic systems
- Education and sustainable development and their concepts

Socio-economic aspects of sustainable development:

- Socio-economic status of the society during the transition to sustainable development
- Environmental Policy and Alternative Technologies
- Strategies of local sustainable development, their monitoring; scenarios and plans forecast based on the consumption of the available environment-friendly products

Literature:

1. Стратегія сталого розвитку. Навчальний посібник / За заг. ред. В. М. Боголюбова. – К.: НАУ, 2008. – 248 с.

2. Український національний посібник з використання процедури стратегічної екологічної оцінки в рамках національної системи прогнозування, планування та екологічної оцінки. / Під ред. О. Борисова, А. Юркевичюте, Г. Мартонакова. – Харків: Видавництво Академії Наук України, 2007.

Additional literature:

1. Hulse J. H. Sustainable Development at Risk: Ignoring the Past. / J. H. Hulse — New Delhi: Cambridge University Press India Pvt. Ltd. Ottawa: International Development Research Centre, 2007. — 390 p.

2. <http://www.rnbo.gov.ua/news/12.html>

3. <http://www.wbcsd.ch/home.aspx>

4. <http://www.undp.org/content/undp/en/home.html>

4. METHODOLOGY AND ORGANIZATION OF SCIENTIFIC RESEARCH

Credits ECTS: 2

Total hours: 72

Form of control: final test-credit with the assessment

Term: 1

Learning objectives:

- knowledge of the methodology and organization of research activities in radiology and other branches of ecology;
- skills of acquisition, storage, processing and distribution of professional scientific information;
- ability to use information technology in professional activities; ability to work in computer networks using specialized software;
- ability to analyze professional, scientific literature and to use it in professional activities;
- skills of natural and man-made environment components sampling for analysis;
- ability to conduct a comprehensive evaluation of ecosystems exposed to radioactive contamination;
- ability to assess the radiosensitivity and radioresistance of communities in ecosystems.

Teaching activities:

Lectures – 12 hours

Practical lessons – 12 hours

Short content:

Methodological and organizational basis for research:

- Methodological research organization
- Techniques for scientific information processing
- Analysis, generalization and presentation of research results

Practical organization of scientific research:

- Requirements for certification and accreditation of laboratories and laboratory equipment
- Sampling and preparation for analysis
- Methods of results processing and fundamentals of mathematical statistics

Literature:

1. Нечаев Ю. И. Основы научных исследований – К: Вища школа, 2001 . – 160с.
2. Севриков В.В. Методология и организация научных исследований - Минск, 2011.- 360 с.
3. Лукина Л.И. Ибрагимов Ю.И. Основы научных исследований – Севастополь, СНУЯЭ и П, 2007 . -40 с.

Additional literature:

1. Цехмістрова Г.С. Основи наукових досліджень . – К.: Видавничий Дім « Слово», 2004 .- 240с.
2. Шейко В.М., Кушнарєнко Н.М. Організація та методика науково –дослідницької діяльності .- К.: Знання , 2004 . – 307 с.

5. RADIOECOLOGY (BY SECTOR)

Credits ECTS: 4,5

Total hours: 162

Form of control: exam

Term: 1

Learning objectives:

- knowledge of nuclear physics and features of the interaction of ionizing radiation with matter;
- knowledge of the principles and methods of radiometry and dosimetry;
- knowledge of physical, chemical and biological principles of the protection of living organisms against ionizing radiation and radioactive contamination;
- knowledge of the mechanisms of radiobiological effects;
- knowledge of current radiological situation in Ukraine;
- knowledge of the migration of radionuclides in the environment;
- knowledge of the mechanisms of action of radiation on living organisms;
- knowledge of the principles of protection the living organisms against radiation and pollution by radioactive substances;
- knowledge of the impact of contamination on natural terrestrial and aquatic ecosystems;
- ability to determine doses for the main components of ecosystems;
- ability to prioritize and isolate significant radiological problems from minor when performing system analysis, on the basis of the results make reasonable conclusions;
- ability of evaluation the radiation conditions using radiometric and dosimetric devices of different systems;
- ability to predict ecological-economic status of areas contaminated with radionuclides;
- ability to calculate population doses from external and internal exposure, and develop measures to avoid exceed doses to the population living in conditions of radioactive contamination of territories;
- ability to develop countermeasures to minimize the finding of radionuclides in agricultural products;
- ability to develop a system of measures to prevent radiation damage to living organisms and contamination of the environment by radioactive substances of natural and artificial origin;
- ability to implement methods of farming in contaminated areas, including agriculture, forestry and landscape management, water management, urban management, operation of transport, food and pharmaceutical industries

Teaching activities:

Lectures – 28 hours

Practical lessons – 26 hours

Short content:

General principles of Radiology:

- Scientific basis of Radiology and stages of development
- Current radiation situation in Ukraine and radiological consequences of the Chernobyl accident
- Methodological principles, basic principles and concepts of modern radioecological research

Radioecology of natural ecosystems:

- Radioecology of forest ecosystems
 - Radioecology of aquatic ecosystems
 - Migration of radionuclides in open and mountainous landscapes
- Radioecology of agrocenosis and of urbanized territories:
- The behavior of radionuclides in agrocenosis
 - Migration of radionuclides to humans through a food chain
 - Character of the radionuclides transfer, their distribution and redistribution in urban systems

Literature:

1. Гудков І.М. Радіоекологія,; Навч. посіб. І.М. Гудков , В.А. Гайченко, В.О. Кашкаров, Ю.О. Кутлахмедов, Д.І. Гудков, ММ Лазарев – К: 2011.- 368 с.
2. Кутлахмедов Ю.О. Основи радіоекології: Навч. посіб./ Ю.О. Кутлахмедов, В.І. Корогодін В.К. Кольтовер; За ред. В.П. Зотова.- К.: Вища шк., 2003.-319 с.
3. Экологические последствия аварии на ЧАЭС и их преодоление двадцатилетний опыт : Доклад экспертной группы Чернобыльского форума – МАГАТЭ, Вена, 2008.- 180 с.
4. 20 лет Чернобыльской катастрофы. Взгляд в будущее.- Национальный доклад Украины/Киев, 2006-472 с.
5. Алексахин Р.М. Ядерная энергия и биосфера;
6. Клековкин Г.В. Радиоэкология: Уч. пособие.- Ижевск.: 2004. – 170с.;
7. Коваленко Г.Д., Волошин В.С. Основы радиационной экологии: Учебник. – Мариуполь.: 2009. – 298с.

Additional literature:

1. Норми радіаційної безпеки України . (НРБУ - 97) – МОЗ України,- Київ 1997
2. Допустимі рівні вмісту радіонуклідів ^{137}Cs і ^{90}Sr у продуктах харчування та питній воді (ДР-97) – Київ, 1997
3. Ведение сельсктго хозяйства в условиях радиоактивного загрязнения территории Украины вследствие аварии на ЧАЭС на период 1999-2002 гг. (методические рекомендации). Пристер Б.С. (ред.). – К.: Ярмарка, 1998.-103 с.

6. RADIATION MONITORING

Credits ECTS: 3

Total hours: 108

Form of control: exam

Term: 1

Learning objectives:

- knowledge of the subject, objectives and scheme of the state system of radiological monitoring;
- knowledge of international recommendations on radiological monitoring of the environment and public exposure;
- knowledge of methods of study monitoring network and optimization of sampling;
- knowledge of the regulatory framework of radiological environmental monitoring;
- knowledge program of observations of the sources of pollution and the level of pollution of the environment;
- knowledge of methods of analysis and forecasting changes in the medium;
- ability to justify the choice of methods and place of observation of the environment;
- ability to use modern methods of analysis and forecasting the radioactive contamination of the environment;
- ability to detect dynamic changes in indicators of environmental conditions;
- ability to apply regulatory materials of EU, Ukraine, Russia and Belarus on the content of radionuclides in the environment;
- ability to develop science-based guidelines to support management decisions in the field of radiation monitoring;
- ability to use GIS technology and mathematical modeling to assess the impact of behavior, distribution and redistribution of radionuclides in different landscape conditions.

Teaching activities:

Lectures – 16 hours

Practical lessons – 12 hours

Laboratory lessons – 8 hours

Short content:

Organization of environmental radiation monitoring:

- Scientific basis, aims and objects of radiation monitoring
- Radioecological monitoring of contaminated ecosystems
- Basic principles of the integrated radiation monitoring

Methods and tools for radiation monitoring:

- Dosimetric and radiometric equipment
- Sampling, and database formation and processing
- Application of GIS technologies in radiation monitoring

Literature:

1. Кашпаров В. А., Калиненко Л. В., Перепелятников Г. П. та ін. Методика комплексного радіаційного обстеження забруднених внаслідок Чорнобильської катастрофи територій (за винятком території зони відчуження).– К.: Атіка-Н, 2007. – 60 с.

2. Постанова Кабінету Міністрів України №391, від 30.03.1998р. «Про затвердження Положення про державну систему моніторингу довкілля». – Режим доступу: <http://www.rada.kiev.ua/cgi-bin/putfile.cgi>.
3. Радиологічний стан територій, віднесених до зон радіоактивного забруднення. – Режим доступу: <http://mns.gov.ua>
4. Орлов А. А., Краснов В.П. Радиационный мониторинг лесных экосистем/ / Весник НЯЦ РК „Радиоэкология, охрана окружающей среды”, № 3. – 2002. – С. 45 – 54.

Additional literature:

1. Краснов В.П., Орлов О.О. Радиационный мониторинг лесных экосистем: концептуальні положення // Лісівництво і агролісомеліорація, вип. 102. –Харків, 2002. – С. 10 – 19.
2. Krasnov V., Orlov A. Multiyear monitoring of radiocontamination of wild berry-plants from the Ericaceae family in Ukraine // Botanica Lithuanica, 2004, 10 (3). – p. 209-215.
3. Krasnov V. Orlov A. Methods and tasks of radiation monitoring of forest ecosystems Eguidosimetry ecological Standarti-zation and Eguidosimetri for Radioecology and Environmental Ecology. – Series C: Environmental Security. – Vol. 2 /Eds. F. Dordrecht: Springer, 2005. – P.307-312.

7. RADIATION SAFETY AND HANDLING RW

Credits ECTS: 3

Total hours: 108

Form of control: exam

Term: 1

Learning objectives:

- knowledge about the basic objects of potential nuclear threat in the territory of Ukraine;
- knowledge of rules, regulations and safety standards;
- knowledge of the basic principles of the state policy in the field of radioactive waste (RW);
- ability to assess the safe management of radioactive waste;
- knowledge of the general characteristics of the nuclear fuel cycle and nuclear reactors;
- knowledge of the principles of regulation of radiation exposure;
- ability to predict the consequences of radiation accidents at various levels;
- ability to organize urgent and immediate countermeasures to ensure staff and the public;
- ability to develop and implement long-term countermeasures to improve the safety of the population;
- ability to classify nuclear accidents on the scale of radioactive release;
- ability to predict changes of radionuclide contamination of the environment due to the formation and accumulation of new post-disaster radionuclides;
- ability to provide security for radioactive waste.

Teaching activities:

Lectures – 18 hours

Practical lessons – 10 hours

Laboratory lessons – 8 hours

Short content:

Norms and standards for radiation safety:

- Norms and principles of radiation safety
- Radiation Safety organization of a territory, a facility, staff and of the public
- Management decisions and organizational measures to ensure radiation safety

Radioactive waste utilization:

- Environmental risks of the nuclear fuel cycle
- Regulations in the field of nuclear technology
- Nuclear fuel and radioactive waste utilization

Literature:

1. Норми радіаційної безпеки України (НРБУ-97): Державні гігієнічні нормативи. – К: Відділ Поліграфії Українського центру держсанепіднагляду МОЗ України, 1997. – 121 с.
2. Ядерна енергія: міф і реальність. Тематичні дослідження з ядерної енергетики / Ред. Ф. Маттес. – К: Фонд Генріха Бьолля, 2010. – 308 с.
3. Chernobyl – Catastrophe and Consequences / Editors J. T. Smith and N. A. Beresford. – Praxis Publishing, Chichester, UK, 2005. – 310 p

Additional literature:

1. Краснов В.П., Ландін В.П., Орлов О.О. Національна доповідь України. 25 років Чорнобильської катастрофи. Безпека майбутнього. Розділ 2.2.4. Київ: КІМ, 2011. – с.91 – 97.
2. Фурдичко О.І., Кучма М.Д., Возняк Р.Р., Краснов В.П. Рекомендації з ведення лісового господарства в умовах радіоактивного забруднення територій. – Київ: МЧС, 2008. – 104 с.
3. <http://www.snrc.gov.ua/nuclear/uk/>
4. nkrzu.gov.ua
5. ThomodHenriksenandDavid Maillie “Radiarion & Health”, 2003. – 226 с.
6. Elizabeth LaTorre Travis “Medical Radiobiology”, 2000. – 302 с.

8. REHABILITATION OF CONTAMINATED AREAS

Credits ECTS: 3

Total hours: 108

Form of control: exam

Term: 1

Learning objectives:

- knowledge of the physical and chemical form of radioactive fallout;
- knowledge of the kinetics and dynamics of mobile and fixed forms of radionuclides;
- knowledge of the laws of accumulation and migration of radionuclides in different soil types;
- knowledge of the vertical transport of radionuclides in the soil;
- knowledge of the dynamics of radionuclides in the link "soil-plant";
- knowledge of the basic principles of rehabilitation of contaminated areas;
- importance of landscape and biochemical patterns of autorehabilitation of environment;
- knowledge of basic processes that affect the speed and direction of autorehabilitation processes;
- ability to identify and predict the impact of soil properties on the rate of downward flow of radionuclides in soils;
- ability to practically apply the laws of transformation of radionuclides in soils of different types;
- ability to simulate the processes of horizontal transfer of radionuclides depending on the structure of the landscape;
- ability to calculate the environmental and economic value of measures for rehabilitation of contaminated areas;
- ability to plan and implement measures for rehabilitation of agricultural landscapes, meadow and forest ecosystems;
- ability to predict the influence of biological characteristics of plants on the accumulation of radionuclides;
- simulate the main processes that affect autorehabilitation of soil and surface water systems;
- consider the space environment created by animals in the process autorehabilitation.

Teaching activities:

Lectures– 18 hours

Practical lessons – 18 hours

Short content:

Autorehabilitation of ecosystems and rehabilitation semi-natural territories:

– Environmental rehabilitation of natural ecosystems, of agrocenosis and of the Chernobyl zone

– Countermeasures used in the Chernobyl zone

– Optimization of nature use on contaminated territories

Technologies and measures to minimize the intake of radionuclides into economic production:

– Countermeasures to prevent and reduce contamination of agriculture, fishery and forestry products

– Technological processing and recycling of products contaminated by radionuclides

– The use of the applied GIS technologies and mathematical models to predict the situations and to make decisions as for the rehabilitation of contaminated areas

Literature:

1. Гудков І.М. Радіоекологія,; Навч. посіб. І.М. Гудков , В.А. Гайченко, В.О. Кашкаров, Ю.О. Кутлахмедов, Д.І. Гудков, ММ Лазарев – К: 2011.- 368 с.
2. Кутлахмедов Ю.О. Основи радіоекології: Навч. посіб./ Ю.О. Кутлахмедов, В.І. Корогодін В.К. Кольтовер; За ред. В.П. Зотова.- К.: Вища шк., 2003.-319 с.
3. Экологические последствия авария на ЧАЭС и их преодоление двадцатилетний опыт : Доклад экспертной группы Чернобыльского форума – МАГАТЭ, Вена, 2008.- 180 с.
4. 20 лет Чернобыльской катастрофы. Взгляд в будущее.- Национальный доклад Украины/Киев, 2006-472 с.
5. Алексахин Р.М. Ядерная энергия и биосфера;
6. Клековкин Г.В. Радиоэкология: Уч. пособие.- Ижевск.:. 2004. – 170с.

Additional literature:

1. Норми радіаційної безпеки України . (НРБУ - 97) – МОЗ України,- Київ 1997
2. Допустимі рівні вмісту радіонуклідів ^{137}Cs і ^{90}Sr у продуктах харчування та питній воді (ДР-97) – Киев, 1997
3. Ведение сельсктго хозяйства в условиях радиоактивного загрязнения территории Украины вследствие аварии на ЧАЭС на период 1999-2002 гг. (методические рекомендации). Пристер Б.С. (ред.). – К.: Ярмарка, 1998.-103 с.

9. GEOGRAPHIC INFORMATION SYSTEMS IN RE

Credits ECTS: 1,5

Total hours: 54

Form of control: final test-credit

Term: 1

Learning objectives:

- knowledge of methods and ways of receiving, storing, processing and distribution of professional scientific information;
- knowledge of the capabilities of information technology in professional activities, work in computer networks using specialized software (KI-02);
- Apply the knowledge of the possibilities of using GIS technology and mathematical models for the prediction of situations and decision-making for the rehabilitation of areas contaminated with radionuclides (PCB-07.03);
- knowledge of the possibilities of using GIS - technology in radiation monitoring (KSP -10.06);
- knowledge of the possibility of using information to create forecast radiological situations in the area contaminated with radionuclides (KSP-05);
- knowledge of how to use GIS technology and mathematical modeling to assess the impact, behavior, distribution and redistribution of radionuclides in different landscape conditions (KSP-10);
- ability to analyze and process the professional and scientific literature, to use it in a professional activity (KI - 10);
- skills based on the principles of radiation safety and health and safety regulations to assess the stability of household objects in emergency situations, connected, associated with possible radioactive contamination of environment (3.SP.D.02.PR.O.04);
- skills of using research results to accumulate the resulting structure in the form of databases and information systems to create relevant predictions of the behavior of radionuclides in ecosystems of different types (7. PF. E. 02. ZP. R. 04);
- ability to use environmental and economic criteria for developing management decisions, evaluate and carry out activities aimed at minimizing pollution radioactive areas of environmental and economic rehabilitation (5. SP. E. 02. PP. N. 03);
- ability to predict ecological-economic status areas contaminated by radionuclides (KSP - 07)

Teaching activities:

Lectures – 6 hours

Practical lessons – 12hours

Short content:

Geographic Information Systems in Radiology:

- Basic terms and definitions
- Organization of Data in GIS
- Computer models of the visual representation of geographic data
- Technology of content and digital maps in GIS MapInfoProfessional

Literature:

1.Шевчук В.Я., Саталкін Ю.М., Білявський Г.О. та інші. Екологічне управління. Підручник. – К.: Либідь, 2004. – 432с.

2. Екологічний менеджмент. Навчальний посібник / За ред. В. Ф. Семенова, О. Л. Михайлик. — К.: Центр навчальної літератури, 2004. — 407 с.
3. Бабина Ю. В., Варфоломеева Э. А. Экологический менеджмент. Учебное пособие. — М.: Перспектива, 2002. — 207 с.
4. Папенков К. В. Экономика и природопользование. — М.: Изд-во МГУ, 1997. — 240 с.
5. Пахомова Н. В., Эндрес А., Рихтер К. Экологический менеджмент. — СПб.: Питер, 2003. — 544 с.

10. BASICS OF RADIOANALYTICAL METHODS IN RADIOECOLOGY

Credits ECTS: 1,5

Total hours: 54

Form of control: final test-credit with the assessment

Term: 1

Learning objectives:

- knowledge of radioanalytical methods of diagnosing the environment;
- knowledge of methods of isotope dilution and isotopic exchange;
- knowledge of radiochemical method;
- knowledge of neutron-activation method and its possibilities;
- ability to determine metrological processes in the samples by isotope dilution;
- ability to identify microscopic impurities in the samples by isotope exchange;
- ability to produce radionuclide metrology training model of neutron-activation analysis;
- ability to produce training samples for further environmental exposure;
- ability to process measurement results and give final data on pollution

Teaching activities:

Lectures– 16 hours

Practical lessons – 16 hours

Short content:

The main sources of pollution:

- Radioindicator methods in the analysis of environmental contaminants (isotope dilution, isotopic exchange, features);
- Neutron - neutron activation analysis in the diagnosis of environment and its features;
- Fundamentals of radiochemical analysis in the diagnosis of the environment.

Literature:.

1. Влияние активности естественных радионуклидов строительных материалов на радиационный фон помещений: Учебное пособие / Под ред. О.П. Сидельникова. – М.: Энергоатомиздат, 1996. -160 с.

2. Диагностика окружающей среды радионалитическими методами [Текст] / Ю.Тельдеши, Ю.В. Яковлев, Г.Н. Билимович. – М.: Энергоатомиздат, 1990. - 192с.

3. Радиоактивные вещества и человек [Текст] / Л.А. Булдаков. - М.: Энергоатомиздат, 1999. -160с.

Additional literature:

1. Математическое моделирование миграции радионуклидов в водных экосистемах [Текст] / И.И. Крышев. – М.: Энергоатомиздат, 1999. - 152с.

2. Радиационная безопасность и защита АЭС [Текст] : сб.ст./ Е.А. Егоров- М.: энргоатомиздат, 1990 – Вып.10. - 136с.

11. BUSINESS FOREIGN LANGUAGE

Credits ECTS: 3

Total hours: 108

Form of control: final test-credit with the assessment

Term: 1

Learning objectives:

- Knowledge of 300 - 400 lexical items, specifically - technical and thematic vocabulary in Radioecology pertaining to neutral and formal style;
- knowledge of lexical - grammatical phenomena in the volume of the selected level for written communication;
- ability to write a letter within the subjects studied with the use of common clichés to convey communicative intentions;
- ability to make written communication in a foreign language on radioecological topics, using expressions that are typical for scientific report;
- ability to create summaries, essays, literature reviews by profession;
- ability to execute documents necessary for employment abroad;
- ability to improve your own language skills.

Teaching activities:

Practical lessons – 36 hours

Short content:

1. Basics of Business and Academic Writing:

- About Myself. Applying for Job;
- At a Conference;
- A research Paper;
- A Research Paper;
- A Research Paper Abstract;
- An Essay;
- A Summary.

Literature:

1. Горбунова Н.П. Бубнова Д.В. - MasterEnglish: Навчальний посібник для магістрантів . – Сімферополь : Таврія , 2007 .- 112 с.
- 2.Бубнова Д.В., Корж Т.Н. TestsinBusinessEnglish : Збірник тестів .- Севастополь: СКУАЕ та П , 2008 . – 36с.
- 3.Бубнова Д.В .Hear! Hear! : Зошит для самостійної роботи з навчання аудіювання для студентів , що вивчають ділову англійську мову.- Севастополь: СКУАЕ таП , 2009 . – 78с.

Additional literature:

- 1.Горбунова Н.П.WritingforBusiness . Сімферополь : Таврія, 2003 .- 68 с.
2. Англо –російсько – український словник науково – технічної термінології / Під ред.. М. Андрєєва . – Харків : Факт , 1999 .- 704с.
3. Григорьев В.Б. Как работать с научной статьей : Учебное пособие. – М.: Высшая школа , 1991 . -202с.

12. HIGHER EDUCATION OF UKRAINE AND THE BOLOGNA PROCESS

Credits ECTS: 1,5

Total hours: 54

Form of control: exam

Term: 1

Learning objectives:

- knowledge of peculiarities in scientific research organization and in the system of higher education in Ukraine and in the world;
- ability to compare structures of higher education in different countries;
- knowledge of the main tasks, conceptions and stages of Bologna process;
- analyzes of the main ways and mechanisms of reforming the system of higher education in Ukraine;
- knowledge of legislative acts about reforming the system of higher education in Ukraine towards European integration;
- ability for modeling educational-methodical and organizational documents which provide training of modern specialist (on the basis of the Industry Standard of higher education in Ukraine).

Teaching activities:

Lectures – 10 hours

Practical lessons – 8 hours

Short content:

Characteristics of Ukrainian Education in the framework the Bologna Process:

- Global education systems and their characteristics
- Branch standards of higher education in the framework of Bologna Process

Literature:

1. Степко М. Ф., Болюбаш Я. Я., Шинкарук В. Д., Грубінко В. В., Бабин І. І. Вища освіта України і Болонський процес: Навчальний посібник / За редакцією В. Г. Кременя. – Тернопіль: Навчальна книга – Богдан, 2004. – 384 С.

2. Журавський В. С., Згуровський М. З. Болонський процес: головні принципи входження в Європейський простір вищої освіти. – К.: ІВЦ “Видавництво «Політехніка»”, 2003. – 200 с.

3. Основні засади розвитку вищої освіти України в контексті Болонського процесу (документи і матеріали травень – грудень 2004 р.). Частина 2. / Упорядники: Степко М. Ф., Болюбаш Я. Я., Шинкарук В. Д., Грубінко В. В., Бабин І. І. – Київ – Тернопіль: Вид-во ТНПУ ім. В. Гнатюка, 2004. – 201 с.

4. Основні засади розвитку вищої освіти України. Частина 3. / За ред. С. М. Ніколаєнка, упорядники: Степко М. Ф., Болюбаш Я. Я., Шинкарук В. Д., Грубінко В. В., Бабин І. І. – Київ – Тернопіль: Вид-во ТДПУ ім. В. Гнатюка, 2006. – 180 с.

5. Галузевий стандарт вищої освіти України: Освітньо-професійна програма підготовки бакалавра. – Видання офіційне, МОНМСУ. – К.: 2011. – 36 с.

6. Галузевий стандарт вищої освіти України: Освітньо-кваліфікаційна характеристика. – Видання офіційне, МОНМСУ. – К.: 2011. – 45 с.

13. INTELLECTUAL PROPERTY

Credits ECTS: 1

Total hours: 36

Form of control: final test-credit

Term: 1

Learning objectives:

- knowledge of the nature and types of intellectual property , especially its application in the modern business environment ;
- knowledge about the order of execution of intellectual property rights to intellectual property and the rights and responsibilities of intellectual property arising from protection;
- knowledge of the international system of protection of intellectual property;
- knowledge of normative - legal acts of Ukraine and international treaties governing the relations in the field of intellectual property;
- ability to use normative - legal acts and international treaties that regulate relations in the field of intellectual property;
- ability to use intellectual property rights in business enterprises

Teaching activities:

Lectures – 6 hours

Practical lessons – 6 hours

Short content:

Legislative regulation of intellectual property and patenting:

- Regulation characteristics and legislation of intellectual property in Ukraine
- Fundamentals of Patenting

Literature:.

1. Коваль В.О. Верба І.І. Основи інтелектуальної власності . Севастополь. СНУЯЕ та П, 2011. – 240 с.
- 2.Полторак А., Лернер П. Основы интеллектуальной собственности.: Пер. с англ. – М.: Издательский дом “Вильямс”, 2004. – 208 с.
- 3.Право інтелектуальної власності. Підручник. / За ред. О. А. Підпригори, О.Д. Святоцького. – К.: “Видавничий дім “Ін Юре”, 2004. – 672 с.

14. LEGAL TRAINING IN HIGHER EDUCATION

Credits ECTS: 2

Total hours: 72

Form of control: final test-credit

Term: 1

Learning objectives:

- knowledge of the national law of higher education;
- knowledge of the forms and methods of state regulation and control in science and scientific and technical activities;
- knowledge of benefits for employees enrolled in high school and graduate;
- knowledge of the main provisions of national law on protection of personal data;
- knowledge of basic forms of common legal documents;
- understand the legal nature of the legal situation and be able to analyze it on the basis of legal thinking;
- ability to work with legal concepts and legal literature;
- ability to work with standard legal documents, agreements and contracts;
- able to protect the reputation, honor and dignity;
- ability to practice law on access to public information and protection of personal data;
- ability to protect your rights and fulfill your responsibilities as future research - teachers or administrators.

Teaching activities:

Lectures – 18 hours

Practice lessons – 18 hours

Short content:

Fundamentals of national law of higher education:

- Department of Higher and postgraduate education, retraining and qualification;
- Management science in Ukraine;
- Vocational education and training;
- The base legislation on access to public information and appeals.

Literature:

1. Закон України « Про вищу освіту» від 17.01. 2002 року⁴
2. Закон України « Про захіст персональних даних» від 1 червня 2010 року;
3. Валеєв Р.Г Освітне право : навчальний посібник , міжнародний фонд « Відродження» , - Харків: Видавництво народної української академії (НУА) , 2011.- 186с.

Additional literature:

1. Жернаков В.В. та ін.. Трудове право: Нач. Посібн.- К.-2005
2. Типові форми юридичних документів: Довідкове видання (угоди, контракти, договори, акти . Упорядник Стаматіна М.В. – 5 вид., переробл.; доповн.- Харків: Арсис , 2002, - 672с.

15. BIOLOGICAL EFFECTS OF IONIZING RADIATION

Credits ECTS: 3

Total hours: 108

Form of control: final test-credit with the assessment

Term: 1

Learning objectives:

- knowledge of the causes of great striking ability of ionizing radiation, levels of biological effects of ionizing radiation (BEIR);
- knowledge of mechanism and basic tools of chemical radio protection;
- knowledge of the phenomenon hormezysa - biopositive effect of low doses of radiation;
- knowledge of radioprotective organism systems, components of antioxidant system and their role in the mechanism of radioprotection;
- skills through knowledge of physicochemical and biological mechanisms of action of ionizing radiation on living organisms to assess radiobiological effects of radiation;
- ability to use chemical and biological means of prevention against possible effects of radiation on the body;
- ability to provide first aid to people affected by a radiological emergency.

Teaching activities:

Lectures – 18 hours

Practical lessons – 18 hours

Short content:

The specificity of the biological effects of ionizing radiation;

- BDIV molecular level;

- Cell level BDIV;

Organism level BDIV

- Radiation syndromes;
- Long-term effects of radiation of organism;
- Types of radiation;
- Chemical means of radioprotection.

Literature:.

1. Лукина Л.И. Биологическое действие ионизирующего излучения и механизм химической радиозащиты . – Севастополь .: СНИЯЭ и П , 2002, 96 с.
2. Журавлев В.Ф. Токсикология радиоактивных веществ . – М: Энергоатомиздат , 1990 , 150 с.
3. Ярмоненко С.П. Радиобиология человека и животных .- М.: Высшая школа , 1988 , 72 с.
4. Бутомо Н.В. Ивницкий Ю.Ю., Гребенюк А.Н . Основы БДИИ . Учебное пособие , СПб., 1999 . -72 с.

Additional literature:

1. Норми радіаційної безпеки України (НРБУ – 97) – МОЗ України , Київ , 1997.
2. Окислительные процессы при гамма –нейтронном облучении организма / Под ред. Е.Е. Чеботарева . Киев : Наукова Думка , 1986 , 92 с.

16. RADIATION SOURCES AND ASSESS OF THEIR IMPACT ON THE ENVIRONMENT

Credits ECTS: 2

Total hours: 72

Form of control: exam

Term: 1

Learning objectives:

- knowledge about routes of radioactive isotopes into the body of plants, animals and humans and their redistribution;
- knowledge of the patterns of behavior of radionuclides in the major types of terrestrial and aquatic ecosystems of natural and anthropogenic origin;
- knowledge of the environmental rehabilitation of natural ecosystems on contaminated areas;
- knowledge of countermeasures applied to contaminated areas;
- technological knowledge of processing and recycling business products contaminated with radionuclides;
- ability to assess the overall environmental situation resulting from environmental pollution by radionuclides;
- ability to identify trends in environmental changes caused by the operation of radiologically hazardous facilities and alienation of contaminated areas;
- skills tailored to suit autorehabilitation of territories contaminated with radionuclides, to develop technological measures of rehabilitation;
- ability to identify ways and evaluate measures aimed at minimizing the intake of radionuclides to the products of agriculture, forestry and fisheries.

Teaching activities:

Lectures– 10 hours

Practical lessons – 10hours

Laboratory lessons – 4 hours

Short content:

Natural and artificial radiation sources:

- Natural background radiation
- Technogenic-modified background radiation
 - Radiological consequences of the Chernobyl accident

Assessment of radiological impact on the environment and human

- Movement of radionuclides in food chains
- Calculation of annual oral intake of radionuclides

Literature:.

1.Гудков І.М. Радіоекологія : навчальний посібник / / І.М. Гудков, В.А. Гайченко , В.О.Кашпаров та інші. – К.,2011. – 367 с.

2. Коваленко Г.Д. основы радиационной экологии : учебник / / Г.Д. Коваленко, В.С. Волошин.- Мариуполь: Рената, 2009 .- 297 с.

3.Экологические последствия аварии на ЧАЭС и их преодоление: двадцатилетний опыт – Вена, МАГАТЭ, 2008

Additional literature:

1. Бобошко В.М. Оценка воздействия радиационных источников на окружающую природную среду : Методические указания по курсовому проектированию // В.М.Бобошко, И.В. Поднебесная .- Севастополь: СКУЯЭиП , 2000 .- 90с.
2. Лукина Л.И. Расчет референтных доз облучения населения Украины , вследствие аварии на ЧАЭС : Методические указания по выполнению курсовых работ // Л.И. Лукина, Д.В. Моисеев, М. А. Фролова .- Севастополь : СКУЯЭ и П, 2012 .- 44с.
3. Сапожников Ю.А. Радиоактивность окружающей среды : учебное пособие // Ю.А. Сапожников, Р.А. Алиев, С.Н.Калмыков . – М: БИНОМ. Лаборатория знаний, 2006. –286с

15. LEGAL ASPECTS OF RADIOECOLOGY

Credits ECTS: 3

Total hours: 108

Form of control: final test-credit with the assessment

Term: 1

Learning objectives:

- knowledge of statutory regulations and provisions in the area of protection from electro-magnetic fields (EMF);
- basic knowledge of government and industry standards, regulations, production of documents and regulations for the analysis of technological systems that affect the radiological situation in the areas of control;
- knowledge of legal aspects of radioecological examination;
- knowledge of the legal regime in emergency situations;
- ability to use the legal industry standards, guidelines in the practice of radiological safety at the facilities of the nuclear fuel cycle (NFC), forestry, agriculture, water and utilities, allowing for the particular situation in order to minimize adverse effects on the environment.

Teaching activities:

Lectures – 18 hours

Practical lessons – 18 hours

Short content:

Regulatory - regulatory framework for radiation safety and radiation control:

- Basic rules and sanitary rules of radiation safety in Ukraine;
- Legal and institutional framework destination radiological examination;

Legislative framework for protection of workers and the public from electromagnetic fields:

- The main regulations in the field of standardization, environmental monitoring and examination of EMF;
- International basic safety standards for protection against EMF.

Literature:.

1. Закон України "Про використання ядерної енергії та радіаційну безпеку".
2. Закон України «Про забезпечення санітарного та епідемічного благополуччя населення».
3. Основные нормы и санитарные правила обеспечения радиационной безопасности Украины (ОСПУ-2005)
4. Основні санітарні правила протирадіаційного захисту України”, ДСП 6.074.120– 01
5. Закон Украины „Про правовий режим території, що зазнала радіоактивного забруднення внаслідок Чорнобильської катастрофи”.
6. Закон України "Про поводження з радіоактивними відходами".
7. Закон України "Про захист людини від впливу іонізуючого випромінювання"
8. Закон України "Про видобування і переробку уранових руд"
9. Закон України "Про захист прав споживачів".

10.Постанова Кабінету Міністрів України від 19.08.2002 N 1218 "Про затвердження Положення про державну санітарно-епідеміологічну службу України".

11. Постанова Головного державного санітарного лікаря України від 01.12.97 N 62 "Про введення в дію Державних гігієнічних нормативів "Норми радіаційної безпеки України" (НРБУ-97).

12. Постанова Головного державного санітарного лікаря України від 12.07.2000 N 116 "Про затвердження значень гігієнічних нормативів "Норми радіаційної безпеки України, доповнення: Радіаційний захист від джерел потенційного опромінення" (далі - НРБУ-97/Д-2000).

13. Международные основные нормы безопасности для защиты от ионизирующих излучений и безопасного обращения с источниками излучения. Серия изданий по безопасности №115. – Вена: МАГАТЭ, 1997. – 382 с.

14. ГОСТ 12.1.006-84 Электромагнитные поля радиочастот. Допустимые уровни на рабочих местах и требования к проведению контроля.

15. Державних санітарних правил планування та забудови населених пунктів N 653 (z0885-09) від 31.08.2009)

Additional literature:

1.Основи радіоекології: Навч. посіб. / Ю. О. Кутлахмедов, В. І. Корогодін, В. К. Кольтовер; За ред. В. П. Зотова. — К.:Вища шк., 2003.

2.Пашенко Е.Г.Радиоэкология ч3Основы экологического права уч .пособие-СПб изд СЗТУ 20012

16. RADIATION POLLUTION AND RADIATION SAFETY OF THE POPULATION

Credits ECTS: 2

Total hours: 72

Form of control: exam

Term: 1

Learning objectives:

- basic knowledge of regulations in the field of nuclear safety;
- knowledge of the physical and chemical properties, common mechanisms of behavior of radionuclides in the environment;
- knowledge of the principles of radiation safety and health and safety regulations;
- ability to detect patterns of income, redistribution and migration of radionuclides between the components of the environment;
- ability to assess the impact of radioactive contamination on economic activity and identify environmental risks to humans;
- ability to predict possible changes of natural and semi-natural ecosystems under the influence of radiation accidents;
- ability to develop recommendations on environmental and feasibility grounded business activities in cases of radioactive contamination;
- ability to draw up guidelines for radiation safety of the population in emergency situations on different enterprises;
- ability to practically apply the basic rules of radiation safety provisions of Ukraine;
- skills based on the principles of radiation safety and radiation - hygienic rules to predict consequences, develop and implement economically viable long-term countermeasures to limit the consequences of radiation accidents at various levels.

Teaching activities:

Lectures – 10 hours

Practical lessons – 10 hours

Laboratory lessons – 4 hours

Short content:

- Physical - chemical basis of contamination;
- Basic properties and processes of radionuclide transport in the biosphere;
- Legal regulation of safety in radiation contamination;
- Principles of regulation of radiation safety;
- Accidents and countermeasures;

Literature:

1. Закон України « Про правовий режим території , що зазнала радіоактивного забруднення внаслідок Чоробильської катастрофи»;
2. Система нормативно –правового регулювання ядерної та радіаційної безпеки. Основні положення . ГНД 306. 0. 02./ 1. 001 -97;
3. Інструкції про порядок видачі суб'єктам підприємницької діяльності ліцензій на придбання, володіння, збут, експлуатацію, використання джерел іонізуючого випромінювання, умови і правила здійснення ними цих видів діяльності та контроль за їх дотриманням. Зареєстровано в Міністерстві м.Київ юстиції України 25 квітня 1997 р. за N 161/1965.
4. Нормы радиационной безопасности Украины (НРБУ-97); Государственные гигиенические нормативы. - Киев: Отдел полиграфии Украинского центра госсанэпиднадзора Министерства здравоохранения Украины, 1998. – 134 с. Основні санітарні правила протирадіаційного захисту України”, ДСП 6.074.120– 01

5. Державні санітарно-екологічні правила і норми з радіаційної безпеки при проведенні операцій з металобрухтом Державні санітарно-екологічні правила і норми ДСЕПіН 6. 6.1. - 079 /211.3.9. 001-02
6. Рекомендації по користуванню радіаційно-гігієнічними регламентами захисту населення при захороненні радіоактивних відходів (РАВ) Методичні рекомендації МР 6.6.6. 055.2000.
7. А. В. Носовский, В. М. Гавриш и др. Серия «Безопасность атомных станций» Дезактивация Київ, «Основа» 2009. -298 с.
8. Радиационная безопасность и защита на атомных электрических станциях., Серия «Безопасность атомных станций» Носовский А. В., и др; Оберіг, 2008. – 356 с.
9. Обращение с радиоактивными отходами, Серия «Безопасность атомных станций» А. В. Носовський, З. М. Алексеева, Б. В. И др. К. Оберіг, 2006. – 289 с.
10. Снятие с эксплуатации ядерных энергетических установок Серия «Безопасность атомных станций» / А. В. Носовский, В. М. Васильченко, А. А. Ключников, Я. В. Яценко – К.: Техника, 2005. – 384 с.
11. Шигера Ю. М., Шигера В. Ю. Радиоактивные отходы и методы обращения с ними. Сл: Перспектива 2002 г -356с.
12. Авдеев О.К. Кретин А.А. и др. Радиоактивные отходы Украины: состояние, проблемы, решения. К.: Друк, 2003- 400 с.

Additional literature:

1. Публикация 30 МКРЗ. Пределы поступления радионуклидов для работающих с радиоактивными веществами в открытом виде. - М.: Энергоатомиздат, 1983. – 60 с.
2. Публикация 65 МКРЗ. Защита от радона-222 в жилых помещениях и на рабочих местах. - М.: Энергоатомиздат, 1995 - 78 с.
3. Международные основные нормы безопасности для защиты от ионизирующих излучений и безопасного обращения с источниками излучения. Серия изданий по безопасности №115. – Вена: МАГАТЭ, 1997. – 382 с.
4. Критерии для принятия решений о мероприятиях защиты населения в случае аварии ядерного реактора (Утв. МЗ СССР от 16.05.1990 г.). – М., 1990. - 16 с.
5. Общие положения обеспечения безопасности радиационных источников. НП-038-02 Госатомнадзор России Москва, 2002
6. Международные основные нормы безопасности для защиты от ионизирующих излучений и безопасного обращения с источниками излучения. Серия изданий по безопасности №115.
7. Серия изданий МАГАТЭ по безопасности. Готовность и реагирование в случае ядерной и радиационной аварийной ситуации Серия изданий по безопасности № GS-R-2.
8. Серия изданий МАГАТЭ по безопасности. Обращение с радиоактивными отходами, образующимися в результате использования радиоактивных материалов в медицине, сельском хозяйстве, исследованиях и образовании. Серия норм по безопасности, № WS-G-2.7
9. Серия изданий МАГАТЭ по безопасности. Руководства МАГАТЭ по безопасности.
10. Принципы изъятия источников излучения и видов работ из-под регулирующего контроля. 11. Серия норм по безопасности, № 89
12. Основные рекомендации МКРЗ и нормы МАГАТЭ по радиационной защите Дж. А. М. Вебб. 180с
13. Серия изданий МАГАТЭ по безопасности. Радиационная защита при профессиональном облучении Серия норм по безопасности, № RS-G-1.1

Sevastopol National University
of Nuclear Energy and Industry.

Approved

Rector SNUNEI

_____M.M.Diviziniuk

« ___ » _____ year 2013

Program of
practice of SNUNEI students
of specialty: **8 .04010605 «Radioecology»**

The program is approved by the academic council
of Institute of Environmental and Information Security,

protocol № from year.

Sevastopol

I. General statements.

In accordance with the curriculum of training in the specialty 8.04010605 "Radioecology" there is provided research and teaching (pre-diploma) practice

The practice is performed in academic and research institutions, research centers, national, regional and city administrations, the nuclear fuel cycles, nuclear power plants, units of the Ministry of Emergency Situations and other institutions.

The purpose of the practice is the development by masters of modern methods of water purification, air, soil contaminated with radionuclides territories, forms of organization and working conditions in accordance with the future profession, forming the basis on which obtained at the University of knowledge, skills and abilities to make independent decisions on specific work in a real production environment, the development needs of the systematic increase of the knowledge and creativity of their use in actual practice.

The practice of master's degree is based on the continuity of the sequence and its conduct during the entire period of study in order to obtain the required amount of practical knowledge and skills in accordance with the requirements of the qualifying characteristics of the "master."

List of practice questions, the format, timing and duration are determined by the curriculum for the preparation of the master.

The content and sequence of practice is determined by the work program being developed by the graduating department in accordance with the curriculum.

For the work program there are developed recommendations for checking the level of knowledge and skills that masters should reach during practice.

Responsibility for the organization, implementation and monitoring of the practice lies with the Vice Rector for Academic Affairs. Teaching and guidance, the program of practice in the specialty provides the graduating department.

The overall organization of the practice of control over its conduct is done by the head of the practice in accordance with the order of the rector of the university.

Head of practice of the institute must:

1. Before the start of practice to ensure the readiness of practice sites to receive students.
2. Conduct a review of the organization of the practice.
3. Ensure that the students have the individual task and the score sheet.
4. To explain students the practice program and reporting procedures for the practice (the order of taking the differentiated test, a written report, etc.);
5. Personally conduct workshops with students on agreed themes of the program practice.
6. To participate in the reception of intern tests.
7. Make a written report about the practice and submit it to the head of the department issuing it no later than 10 days after returning from practice

Students of the Institute during the traineeship must:

Prior to the start of practice (2 weeks) to receive instructions from the head of the practice on the organization, characteristics of the practice and all necessary documents for the practice.

To study the program of practice and get in the department the individual tasks and score sheet.

Arrive on time to the place of practice.

Fully implement all points of practice and individual task.

Study and strictly follow the rules of labor protection, safety and health regulations.

Be responsible for the performed work.

Write a report (20-30 pages of handwriting with graphs, figures, etc.) and sign it at the head of the practice of the enterprise and in a 10-day period to submit the report to the department, to protect his commission and get an overall assessment of the practice. Overall score for the practice is submitted to the scoring sheet and a student gradebook.

Student's grade for the practice is taken into account in determining the scholarship along with final estimates of the session.

A student who received a failing grade for practice, will be expelled from the university.

The results of the practice are discussed at a meeting of the graduating department.

1. ORDER OF DOCUMENTS FOR STUDENTS.

1. The draft order on the practice prepares the student dean's office a month before the start of practice.
2. Score sheet and individual assignments for students are prepared by the specialty department, 2 weeks before the start of practice.

All documents for the practice the students personally receive at the dean's office.

After the end of the operational practices of the head of the practice must:

In the period of research and teaching (pre-diploma) practice the head of practice provides along with assisting in the selection of masters the necessary material and information on the theme of master's work, the partial passage of Masters training for a specific job (assistant, engineer) on a separate plan drawn up by the head of the graduating department .

At the end of practice the head of practice makes a review of the practical experience and transmits the report to the graduating department of institution.

2. AFTER THE END OF PRACTICE MASTERS MUST:

To know:

1. Laws and regulations, decisions of Ministers of Ukraine, decrees and orders of the Ministry of Ecology and Natural Resources on environmental safety.
2. Organizational structure, job descriptions of staff position of a structural unit, the documentation for the environmental performance of the enterprise, forms of organization and management of environmental activities and external relations with government departmental organizations.
3. Models of environmental management system in accordance to environmental policy of the organization.
4. Elements of activities, products or services of an organization that can interact with the environment, change the environment in favorable or unfavorable way, in whole or in part.
5. The device, the operating principle of engineering controls of environment.
6. The organization of the use of technical means to ensure environmental safety, their technical capabilities.
7. Rules of operation and repair of technical equipment to ensure environmental safety.
8. The order of creating the environmental control graphics.
9. Key processes and modes of operation, enterprise, organization system safety.
10. The order of evaluation the impact of activities, products and services of the organization.
11. Regulation of emissions into the atmosphere of the enterprise on the basis of calculating the MPE largest concentration limits for impurities (MPC) in the atmosphere.
12. Measures to protect against contamination of water intakes.
13. Areas of operating industrial solid waste management of the enterprise.
14. Method and apparatus for the treatment of industrial emissions.
15. The requirements of radiation safety, radioactive waste disposal regulations, health rules for handling RVs, construction and operation of the tail storages processing of nuclear fuel cycle.

To be able to:

1. Implement, maintain and improve the management of the environment.
2. Analyze an organization's management system conforms to the requirements of the declared environmental policy, and provide evidence to other interested parties on such compliance.
3. Carry out certification of environmental management systems for compliance with the model.
4. Declare that the activities, products or services meet the standards.
5. Analyze production processes in order to minimize emissions and discharges of the enterprise.
6. Determine the emissions from different parts of the enterprise.
7. Calculate the required efficiency of sewage treatment plants.
8. Expert knowledge of the process flow diagram and apparatus of nuclear fuel cycle.
9. Use devices and equipment and environmental radiation monitoring to determine the extent of chemical and radioactive contamination.

2.1.AFTER WORK IN LABORATORY MASTERS MUST:

To know:

1. Requirements for regulatory documents, the sampling of soil, water and air.
2. Features of preparation of samples for analysis of the contents of individual parameters.
3. The mechanisms underlying the techniques of qualitative detection of chemical and radioactive substances.
4. Certified and approved procedures for determination of individual ingredients in the environment of the production program of the workshop.
5. The formulas and coefficients for calculating the concentration determined by chemical and radioactive substances.

To be able to:

1. Take samples of soil, water and air, guided by the regulations on sampling.
2. Perform the necessary operations to prepare the samples taken for analysis (weighing, drying, finishing to a constant weight, filtration, calcination, extraction, evaporation).
3. Prepare solutions of different concentrations of chemicals (standard, basic, working, buffer).
4. Prepare the calibration range, build the relationship between the concentration and instrument readings, calculate the calibration factor.
5. Be familiar with basic techniques used to determine the chemical content (gravimetric, titrimetric, photo and spectrometric).
6. Use reference books.

Sevastopol National Institute of Nuclear Energy and Industry.

**Curriculum
of research and teaching practice
of masters of SNUNEI.**

Specialty: **8.04010605 «Radioecology»**

Graduating department «Radioecology and Environmental Safety»

Form of study	Course	Semester	Theoretical studies	Practical studies	Duplication	Independent work	Credit (hours)	Altogether
Full-time	5	10	12	30	124	76	10	152

The program is designed by the REandES department

Protocol № from 2013

Head of department

Ibragimov Yu.I.

1. Bases of pre-diploma practice of masters of SNUNEI of specialty **8.04010605 "Radioecology"** are:

Academic institutions:

- MHI NASU Institute of Marine Hydrophysics.
- IBSS Institute of Biology of the Southern Seas National Academy of Sciences.

Research institutes:

- SINEKO Sevastopol Institute of Environmental Engineering and Information Studies.
- Research PYaEP Research Institute of Nuclear Energy and Industry.

Research centers:

- SIC Research Center and the National Academy of Sciences of Ukraine "State Aquarium."
- SIC VMSU Research Center of the Naval Forces of Ukraine.

Management of the Sevastopol City State Administration.

Enterprise of the nuclear fuel cycle.

Nuclear power plants.

Division of the Ministry of Emergency Situations.

Other businesses, organizations and institutions.

The aim of practice:

1. Perform an individual task in the pre-diploma practice (collection of materials for the master's work.)
2. To introduce the model training programs for primary office.
3. Almost process the functional responsibilities in the workplace (duplication) primary positions.

Objectives of practice:

1. Collection of materials for an additional project in the organization, where the practice is held, according to the assignment of the head of the master's work.
2. Organization of control of radioactive pollution.
3. The study of real operations and features of the training on the primary positions in everyday and extreme situations.
4. Duplication of workplace operations staff under the supervision of institutions, where the practice is held.

1. As a result of the practice masters must:

Know:

1. Guidelines that define the organization's work in everyday conditions and during an extreme (accident and emergency) situations.
2. The organization of the workplace primary (duplicated) officer agency.
3. Composition of technical and information support units, where the practice is held.
4. The order of the specialist training and organization of leisure for independent duties.
5. Maintenance organization, information and communication tools and peripherals.
6. Safety, organization of work and the protection of security measures at the facility.

Be able to:

1. Use the data for processing equipment, information communication and peripheral devices in the workplace.
2. Perform predictive and analytical calculations in accordance with the task.
3. Carry out maintenance of equipment in his superintendence
4. Fill the operational and technical documentation.
5. Observe the safety and security measures.
6. Perform functional responsibilities of a primary position in the workplace units, where the practice is held.

2. A master during the practice must:

1. Fully perform and practice program objectives.
2. Obey the research center the internal rules and regulations.
3. Strictly observe the safety measures provided in the research center.
4. Daily report to the head of the practice on the implementation of the program of practice.

3. Head of practice of institute must:

1. Ensure the organization of practice.
2. Monitor the traineeship students, organize and conduct tours, practical and theoretical sessions.
3. Report periodically to institute on progress in practice.
4. Perform a closing of score sheet on separate sections of the program.
5. Provide that the student writes the final essay.

4. Head of practice of enterprises must:

1. Together with the head of the practice of the institute organize a practice for masters.
2. Together with the head of the practice of the institute organize and conduct tours, practical and theoretical lessons.
3. Together with the head of the practice of the institute enforce masters to safety regulations.
4. Together with the head of the practice of the institution ensure the acceptance of tests on the individual sections of the program practice.

5. Head of master's work must:

In accordance with the task to carry out the master's work by filling-goal page (individual assignments) that the master is obliged to carry out during the practice.

6. Supervision of the work of masters during practice.

Control of the practice is done by the head of the practice, dean of the faculty or inspection group, appointed by the rector.

People exercising control, take corrective action, report on their actions to rector and head of enterprise.

During practice, masters are fully subject to the internal rules and regulations, enterprises, institutions, responsible for the work performed and its result on a par with regular employees.

1. Summing-up

At the end of practice masters provide to graduating department score sheet signed by the head of the practice of enterprise and representative of the institute and report in accordance with the tasks assigned.

Academic record with estimates for the practice made by the graduating department and is given to the dean's office.

Practice report stores in the issuing department during the year.

2. Methodical recommendations

To study the common issues in the institution, its structure, interaction of divisions, classes with master's degrees advantageously carried out in the form of industrial tours, lectures, seminars, independent and practical training using computer and information training programs. List, topics and the form are determined by the co-leaders of the practice of the institution and the institution.

Classroom training is conducted as in groups or individually under the guidance of the representatives of the institution.

During the practice with the masters to be held lessons at the following **recommended topics:**

1. Guidelines that define the work of institutions in everyday conditions and during an extreme (accident and emergency) situations.
2. Organization of jobs in the unit, where the practice is held.
3. Purpose, structure and characteristics of the hardware used in the workplace.
4. The program of specialist training and the organization of his leisure time to his duties as an independent.
5. Maintenance of engineering, information and communication tools and peripherals.

6. Safety measures and regime activities conducted at the facility.

Practical training is carried out by representatives of agencies, the head of the institute practices in the workplace, in order to study the real operational staff and adapting of the master to the functional responsibilities at the specific workplace on the following topics:

1. The order of performance of forecasting and analytical calculations in accordance with this task.
2. The management of the environmental pollution control devices, information and communication and peripheral devices during the task.
3. Rules for filling the operational and technical documentation during the task.
4. The procedure of maintenance of equipment on the workplace.
5. Procurement of software and mathematical software in the unit.
6. Rules for access to databases and knowledge relating to the competence of units in the facility where the practice is held.

Course Topics may be amended and supplemented by joint decision of the head of the practice from institute and enterprise.

Duplication (training for a specific post) is held in the workplace under the supervision of experienced employees, usually during a specific task.

Independent work is carried out in the hours allocated for self-study. At this time, the master is obliged to examine the issues in accordance with individual task manager of master's work and report on the practice.

Appendix 1

«APPROVE»

Head of ИИиЭБ

Yu.A.Omelchuk

« » _____ 2012г.

Theoretical training					
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Practical training					
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Conclusions of the head of MW (master work) after ending the pre-diploma practice:

evaluation

HEAD OF MW _____

Generalized requirements as for the specialist competencies

SOCIO-PERSONAL COMPETENCIES:

- ability to organize and define the goals and objectives of the personal and collective activities and to ensure their efficient and safe performance;
- adaptability and tolerance, capability for creative activity, including collective;
- ability to systematic creative thinking, perseverance in professional and research activities;
- ability to organize the activity as an individual or as a part of collective activity;
- ability to use professional skills in social activities; an active civil position;
- ability to present personal and collective results of professional and research activities;
- ability to solve problems of innovative character;
- ability to search for alternative solutions in professional activities;
- creativity, the ability for individual scientific research activities;
- professional ability to communicate in foreign languages (English) with foreign scientific partners;
- capacity for criticism and self-criticism;
- capacity for self-development and self-improvement;
- leadership and autonomy in the implementation of innovative projects;
- social responsibility for the results of making professional decisions.

GENERAL SCIENTIFIC COMPETENCIES:

- knowledge of the basic dynamics' regularities of open systems, the relationship between the factors of sustainable development;
- ability to use indicators of sustainable development to confirm decisions related to the development of socio-economic systems at global and regional levels;
- skills to use sustainable development indicators to assess environmental risks of economic development perspectives in the region;
- ability to analyze and predict the social aspects of environmental policy;
- knowledge of the methodology and organization of research activities in radiology and other branches of ecology;
- knowledge of the physicochemical features of the interaction of radiation with matter, natural and artificial sources of ionizing radiation;
- knowledge of the biological mechanisms of the action of ionizing radiation on living organisms and of the patterns of radionuclide metabolism;
- knowledge about the natural and artificial radioactivity of biota; biogenic radionuclides migration in ecosystems;
- knowledge of the basic principles of state policy in the field of radiation safety; radioactive substances use;
- knowledge of physical, chemical and biological principles of living organisms protection from ionizing radiation and radioactive contamination.

INSTRUMENTAL COMPETENCIES:

- skills of acquisition, storage, processing and distribution of professional scientific information;

- ability to use information technology in professional activities; ability to work in computer networks using specialized software;
- ability to analyze professional, scientific literature and to use it in professional activities;
- skills of natural and man-made environment components sampling for analysis;
- ability to master and use advanced equipment; to use the latest technologies for conducting research;
- knowledge of methods and means to assess conditions of labor safety;
- skills to assess collective and individual risks during accidents and disasters caused by natural and man-made factors.