Al-Farabi Kazakh National University
Physico Technical Faculty
Department of Theoretical and Nuclear Physics

APPROVED by
Dean of Faculty Davletov A.E.
"09" 09 2017

EDUCATIONAL-METHODICAL COMPLEX OF DISCIPLINE

TRB 7303 « Technology of radiation safety »

Specialty "6D060500 – Nuclear Physics"
Educational program "on specialty 6D060500 – Nuclear Physics"

Course – 1
Semester – 2
Number of credits – 3

Almaty 2017

Educational-methodical complex of the discipline is made by Takibayev N.Zh., d.s.p.-m., academic of NAS RK, professor lecturer (name, surname, scientific degree, academic rank)

Based on the working curriculum on the specialty "6D060500 – Nuclear Physics"

Considered and recommended at the meeting of the department Theoretical and Nuclear Physics

from «_05__ » ___09___ 2017 year, protocol № 2

Head of department _____ Abishev M.Y.
(Signature)

Recommended by methodical bureau of the faculty

«__06__» __09__ 2017 year, protocol № 1

Chairman of the method bureau of the faculty _____ Gabdullina A.T.
(Signature)

Al-Farabi Kazakh National University
Faculty of Physics and Technology
Chair of Theoretical and Nuclear Physics

Syllabus
Spring semester, 2017-2018 academic year

Academic course information

Discipline's code	Discipline's title	Type	No. of hours per week			Number of credits	ECTS
			Lect.	Pract.	Lab.		
TRB 7303	Technology of radiation safety	Elective	2	1	0	3	5

Lecturer	Takibayev N.Zh., d.s.p.-m., academic of NAS RK, professor	Office hours	Scheduled
e-mail	E-mail: takibayev@gmail.com		
Telephone number	Telephone: 2925-133; 8-777-704-0396	Auditory	319

Academic presentation of the course	**Type of course** (theoretical, practical; basic, elective) and its purpose (role and place of the course in the educational program): Technology of radiation safety **The aim of the course:** to inform doctoral students about the theory of safety with radiation elements or with nuclei, the theory of the characteristics of radiation nuclei.* A) be able to – demonstrate acquired knowledge (specifically) and it's understanding; - demonstrate an understanding of the overall structure of the study field and the relations between its elements (specifically); B) be able to – include new knowledge in the context of basic knowledge, interpret its contents; - analyze educational situation and offer direction to solve it; - use methods (research, calculation, analysis, etc.) inherent to the field of study (specifically) individually or in a group teaching and research activities; C) be able to - synthesize, interpret and evaluate the learning outcomes of discipline, modules, midterm exam content (specifically); D) be able to – constructive educational and social interaction and cooperation in the group; - propose to consider a problem, to reason its importance; - accept criticism and to criticize; - work in a team; E) be able to – recognize the role of taken course in the implementation of individual learning paths. *The system of descriptor verbs must be used during the formation of competences **Active and interactive methods is recommended to ensure deeper understanding and learning of educational material and to achieve learning out comes of the course (individual researches, group projects, case studies and there methods).
Prerequisites	Organization and planning of research
Post requisites	It is necessary in a future professional practice
Information resources	Literature (with an indication of the authors and data output), the availability (number), software and consumables with information about where you can get them. (8-9) Recommended: 1. Zanzonico P. Routine Quality Control of Clinical Nuclear Medicine Instrumentation: A Brief Review. J Nucl Med. 2008;49(7):1114–1131 2. "Radiation". The free dictionary by Farlex. Farlex, Inc. Retrieved 2014-

	01-11. 3. Moulder, John E. "Static Electric and Magnetic Fields and Human Health". Additional: 1. Mozumder, A., and Y. Hatano. Charged Particle and Photon Interactions with Matter: Chemical, Physicochemical, and Biological Consequences with Applications. New York: Marcel Dekker, 2004. Print. 2. Petrucci, Ralph H., William S. Harwood, F. Geoffrey. Herring, and Jeffry D. Madura. General Chemistry: Principles and Modern Applications. Upper Saddle River, N.J.: Pearson Education, 2007. Print.
Academic policy of the course in the context of university moral and ethical values	**Academic Behavior Rules:** Compulsory attendance in the classroom, the impermissibility of late attendance. Without advance notice of absence and undue tardiness to the teacher is estimated at 0 points. **Academic values:** Inadmissibility of plagiarism, forgery, cheating at all stages of the knowledge control, and disrespectful attitude towards teachers. (The code of KazNU Student's honor)
Evaluation and attestation policy	**Criteria-based evaluation:** Assessment of learning outcomes in correlation withdescriptors (verification of competence formation during midterm control andexaminations). **Summative evaluation:** evaluation of the presence and activity of the work in the classroom; assessment of the assignment, independent work of students, (project / case study / program / ...) The formula for calculating the final grade. $$\text{Final grade for the discipline} = \frac{IC1 + IC2}{2} \cdot 0{,}6 + 0{,}1MT + 0{,}3FC$$ Below are the minimum estimates in percentage terms: 5% - 100%: A 90% - 94%: A- 85% - 89%: B+ 80% - 84%: B 75% - 79%: B- 70% - 74%: C+ 65% - 69%: C 60% - 64%: C- 55% - 59%: D+ 50% - 54%: D- 0% -49%: F

Calendar (schedule) the implementation of the course content:

Weeks	Topic title (lectures, practical classes, Independent work of students)	Number of hours	Maximum score
	Module 1		
1	Lecture-1 (L-1). Introduction to Radiation	2	-
	Seminar -1 (S-1). List of radiation elements and characteristics	1	5
2	L-2. Ionizing radiation: Ultraviolet radiation	2	-
	S-2. X-ray	1	5
3	L-3. Gamma, alpha, beta and radiation	2	-
	S-3. Other Classifications of radiations	1	5
	DSWT 1. Prepare the report: Classification of radiations	1	20
4	**L-4.** Radioactivity in material	2	-
	S-4. Types of radioactivity materials	1	5
	Module 2		
5	L-5. Working with radiation	2	-

	S-5. Guiding principles	**1**	5
	DSWT 2. Guiding principles: Justification, Optimisation, limitation	**1**	20
6	L.-6. Risk control when we work	**2**	-
	S.-6. Safety theory	**1**	5
7	L.-7. Physical Forms of Radiation	**2**	-
	S.-7. Future and developing technologies of radiation	**1**	5
	DSWT 3. Prepare the report: How to work with radioactive materials: emergency, security. mechanism	**1**	25
	1stIntermediate Control (IC1)		**100**
8	**Midterm (MT)**		**100**
8	L-8. Nuclear Fission	**2**	-
	S-8. Nuiclear interactions	**1**	5
	Module 3		
9	L-9. Units of radiation intensity	**2**	-
	S-9. Biological effects of radiation.	**1**	5
	DSWT 4. Biological effects of radiation.	**1**	10
10	L-10. Radiation protection	**2**	-
	S-10. External/internal radiation exposure	**1**	5
11	L-11. Radiation Survey meters	**2**	-
	S-11. Dose rate meter	**1**	5
	DSWT 5. Types of Radiation Survey meters.	**1**	10
12	L-12. Laboratory rules	**2**	-
	S-12 Security	**1**	5
13	L-13. Emergency procedures	**2**	-
	S-13. Area decontamination	**1**	5
	DSWT 6. Prepare the report: Emergency procedures	**1**	20
14	L-14. Radioactive waste	**2**	-
	S-14. Classification of waste	**1**	5
15	L-15. Sum of the Radiation	**2**	-
	S-15. radiation worker	**1**	5
	DSWT 7. Prepare the report: How to work: emergency, security	**1**	25
	2nd Intermediate Control (IC2)		**100**
	Exam		**100**
	Total		**100**
Note: Independent work of students with teacher is 7 hours for semester. 3, 5, 7, 9, 11, 13 and 15 weeksareincludedintosyllabus (assignmentsubmission)			

Lecturer_____TakibayevN.Zh.
Head of the Department_____Abishev M.E.
Chairman of the Faculty Methodical Bureau_____A.T.Gabdullina A.T.