Project acronym	**:** UNITE
Project title	**:** UNiversity and Industry for the modernisation of TExtile manufacturing sector in Belarus
Contract number	**:** 544390 -Tempus - 1 - 2013 1 -GR-TEMPUS_JPHES
Starting date	**:** 01/12/2013 **Ending date:** 30/11/2015

Deliverable Number:	7
Title of the Deliverable:	Survey of training needs analysis
Task/WP related to the Deliverable:	WP 3
Type (Internal or Restricted or Public):	Internal
Author(s):	VSTU
Partner(s) Contributing:	MGUF, BSEU

Project Co-ordinator

Company name : TECHNOLOGIKO EKPEDEFTIKO IDRIMA PIPEA
Name of representative : LAZAROS VRYZIDIS
Address : 250 THIVON & P. RALLI
Phone number : +30 210 5381335
Fax number : +30 210 5381150
E-mail : tempusunite@teipir.gr
Project WEB site address : http://www.unite-tempus.eu/

Signature

Document Distribution List		
Organisation	**Name**	**Date**

Document History			
Version	**Date**	**Change by**	**Description of changes**
V0.1	30/10/2014	VSTU	Draft in Russian
V1	31/12/2014	VSTU	Final version in English

Table of Contents

INTRODUCTION

Supplementary professional knowledge is a must for a specialist in view of constant changes of challenges, and working conditions, as related to the improvement of the means of production, and with career development and job change, so continuing education among mature people, becomes an urgent task of our reality. Education is a factor of social protection of mature person promoting adequate orientation in the changing economic and political environment.

High level of competition in the labor market forces many people to sit at the desk again. Diploma of retraining at the level of higher education tend to get people who have felt the lack of fundamental knowledge and seek to improve their skills or learn new skills and realize their labor and creativity in a fundamentally new form of activity for them, successfully adapt to modern conditions of production. Therefore, the market of postgraduate education is grows up each year, and the number of educational institutions that offer another degree increases.

In the modern state policy of Belarus education is seen as a special driving force of social and economic development as a leader in the way of innovation updates. Our country, as well as our neighbors, came into an era when most part of economic wealth is created in the high-tech and knowledge-intensive industries. This not only significantly changes the requirements for training of specialists and their professional and intellectual potential, but also creates conditions for increased use of opportunities neighboring educational systems.

Belarus has developed a flexible, modern and high quality system of additional education for adults. Further training and retraining – for workers, employees, managers and professionals - in the country is carried out by 391 educational institutions. More than 530 thousand of specialists annually are educated in courses of professional training, and retraining (about 14% employees of the total employed population).

1. ANALYSIS OF EXISTING SYSTEM OF SPECIALISTS TRAINING AT VITEBSK STATE TECHNOLOGICAL UNIVERSITY

According to a special permit (license) to conduct educational activities № 02100/0558659, given to the university on the basis of the decision of the Ministry of Education of the Republic of Belarus dated 3.12.2009 № 1154 of 1.09.2010 №585 2.11.2010 №690 and Faculty of Improvement Qualifications and Staff Retraining of Vitebsk State Technological University has the right to retraining with a degree in:

1-26 02 73 "Innovation management"

1-26 02 75 "Advertising management"

1-26 02 76 "Marketing"

1-26 02 82 "Financial management",

1-40 01 73 "Software information systems"

1-27 01 71 "Economics and production management in the housing and communal services",

1-25 04 77 "Consumer Goods Expertise"

1-25 02 72 "Banking",

1-25 03 75 "Accounting and control in industry"

1-19 01 71 "Graphic design".

Number of students limited of full-time (evening) form of education - 25, by correspondence - 700 people.

In accordance with the Decree of the Ministry of Education of the Republic of Belarus of 25 March 2009 №44 (certificate №0000439) following specialties of retraining were accredited:

1-25 02 72 "Banking";

1-26 02 82 "Financial management in Industry";

1-40 01 73 "Software information systems."

In accordance with the Decree of the Ministry of Education of the Republic of Belarus of 25 March 2010 №61 (certificate №0000523 following specialties of retraining were accredited:

1-19 01 71 "Graphic design";

1-25 03 75 "Accounting and control in industry";

1-25 04 77 " Consumer Goods Expertise ";

1-27 01 71 "Economics and production management in the utilities sector."

In accordance with the Order of the Ministry of Education of the Republic of Belarus of 21.12.2012 № 938 (certificate №0000169) was accredited specialty 1-26 02 76 "Marketing".

Education of students in retraining courses can be carried out differently: full-time (day and night) and correspondence forms.

Qualification improvement of staff with secondary and higher education is carried out in profiles (areas) of education: "Science of Education. Vocational education "(areas of education" Vocational Education ")," Communications. Law. Economics. Management. Economics and Industry Engineering" (areas " Communications "," Economics and Management "," Management", "Economics and Industry Engineering")," Facility and Technology "(areas of education" Equipment "," Light industry "," Metallurgy ""Computers", "Quality Assurance", "Intelligent Systems", "Automation"), "Art and Design" (areas of education "Arts. Crafts", "Design"). Number of limited students with secondary and higher education being retrained fully-time (evening) 15, by correspondence - 15 people.

Besides licensed activities Quality Improvement and Retraining Faculty provides training for unemployed people and students in educational programs of training courses.

The period of study for listeners is determined in accordance with the model of common curricula in the fields of training duly approved.

The list of areas of study and the categories of students been trained in the period from the year 2009 to 2013 shown in Table 1.

In VSTU focuses a lot on training and retraining of light industry staff as in Vitebsk region, and the country as a whole. For the implementation of the principle of client-oriented education and creating a system of partnership "university-organization" QIRF has developed a comprehensive communication plan EI "VSTU" with enterprises and organizations of Vitebsk region for 2011-2015 and qualification improvement and retraining for 2011-2015. While developing the above mentioned plan there were closely taken into consideration scientific and practical interests of the academic teaching staff of the University and the urgent need to improve the efficiency of human resource capacity of enterprises.

Short-term training courses of managers and specialists appears to be the most flexible and responsive form to meet the demand of enterprises in acquiring new knowledge and skills training. Over 2013 in different areas of training courses there have been trained 545 listeners, which demonstrated the increase in the amount of 145% in relation to 2012. In sectorial terms, as outsiders were enterprises of light industry, belonging to the group of medium and large enterprises. The latter, as a rule, limited to educational services in the form of one-day seminars, held by the University on behalf of the Vitebsk Regional Executive Committee.

Differentiation of customer needs in various educational services required the development of the needs of individual businesses and departments of personal educational training programs. So, at the request of RUE "VISTAN" for designers of the enterprises were conducted training courses in "Modern technology and computer-aided design in mechanical engineering", "Computer Graphics-based ASCON KOMPAS and AutoCAD», for specialists of Vitebsk and Grodno SMCC- "Identification of textiles "" Testing of light industry products ", and for management of logistics specialists of the Department of the Interior Ministry of the Republic of Belarus" Modern technologies of manufacture of apparel and footwear products. "Within the last questions were studied structural characteristics of clothing and footwear, quality assessment of special shoes, procedures for the submission of claims and other producers of goods, etc.

Positive feedback about the quality of knowledge and skills acquired by students contributed to a positive image of EI "VSTU" as the center of a highly professional education that has led to interest in the educational services of the Department of Corrections of the Republic of Belarus.

Since 2014 VSTU participates in the project "Modernization of Technical and Vocational Education" implemented under the Loan Agreement between the Republic of Kazakhstan and the International Bank for Reconstruction and Development. EI "VSTU" participates in the project as a foreign center of educational training program in "Automation and control gauges in industry."

The most significant form of training to promote innovative projects of Vitebsk region is retraining on the basis of higher education. Only during the last 5 years at the QIRF and EI "VSTU" opened new specialties such as retraining "Banking", "Economics and Production Management in the housing and communal services", "Consumer Goods Expertise", "Graphic Design", "Accounting and Control in Industry. "The basis of grocery policy is a policy of combining of education services, maximizing current income of the University, with services at the beginning stage, which are designed to ensure University with prospects in future. The main fields of current income include such specialty training as "Banking", "Accounting and control in industry" and "Financial Management".

A special place in the grocery specialties row of retraining takes specialty "Economics and Production Management in the utilities sector." That specialty was included in the National Classifier of the Republic of Belarus "Specialties and qualifications" about the suggestion of our university and with the support of the Office of Housing and Utilities of the Vitebsk Executive Committee and the Ministry of Housing and Utilities.

Training of the specialty "Economics and Production Management in the housing and communal services" aimed at fulfilling the requirements of the President of the Republic of Belarus on the appointment on 1 January 2009. "people authorized to manage the joint housing estate in apartment buildings commissioned without creating comradeship and determination by the owners of premises methods for managing these assets. "

During 2009-2011, a diploma of retraining on the basis of higher education received 50 students of the QIRF, most of which were sent at training by regional enterprises and organizations of Utilities Vitebsk region.

In accordance with the decision of the Ministry of Education of the Republic of Belarus of 22 March 2010 EI "Vitebsk State Technological University" is included in the approved "List of educational institutions responsible for drafting model of curricula training in the specialty "Economics and Production Management in the housing and communal services" as a leading educational institution on a distinguished specialty training.

In accordance with the decision of Vitebsk Region Council of Deputies from 18.12.2009 №195 "About adoption of regional integrated program" Personnel 2009-2015 " and in pursuance of article 6.3 of the Plan of control measures of the regional integrated program" Personnel 2009-2015 "(from 18.05.2010), educational institution "Vitebsk State Technological University" petitioned for inclusion in a special schedule areas for retraining of managers and specialists of housing and communal services of the area for training in specialty 1-27 01 71 "Economics and production organization in the utilities sector." and creating a regional fund for preparing the above-noted experts.

For the needs of housing and communal services educational institution "Vitebsk State Technological University" provides also training for chairmen of comradeships in the area of "Organization and Management of joint housing estate." During the 2010-2013 the mentioned direction trained more than 220 students.

The University actively participates in seminars and conferences devoted to the problem of managing shared housing. So, 28.04.2010 based on the International Association of University property managers organized a seminar "Management of housing estate and creating the association of property managers": Belarusian and international experience ", and in the framework of the EU project" Housing reforms involving the population " there took place a dialogue of stakeholders "The joint housing estate: Practice, Problems and Prospects."

QIRF in the organization of its work collaborates with the Committee of Economics of Vitebsk Regional Executive Committee; utility department and department of education of Vitebsk Regional Executive Committee; Labour, Employment and Social Protection of the Vitebsk City Executive Committee, "Association of Employers and Entrepreneurs of Vitebsk region"; Vitebsk regional department of the Department of State Labour Inspection; Restructuring & Bankruptcy Department of Ministry of Economy of the Republic of Belarus; "Bellegprom".

EI "VSTU" as the leading establishment developing model curricula for retraining and educational standards for 4 specialties of retraining actively cooperates with the Ministry of Economy, Ministry of Housing, the Belarusian Chamber of Commerce and SEI "National Institute of Higher Education" and "Bellegprom ".

EI establishes as well contacts with institutions and organizations of the city, which are the bases of training and customer training courses (JV "Belwest", JSC "Kim", JSC "GI", RUE "VISTAN", JSC "Orsha Linen Mill", JSC "Vitebsk carpets" etc.

Table 1 - LIST of learning courses and categories of students who were trained and retrained from 2009 to 2013

№	Title of qualification improvement courses and staff retraining specialities	Category of trainees	Number of groups	Number of audience (pearsons) .	Form of education	Duration of study
1	2	3	4	5	6	7
I Career enhancement (qualification improvement)						
2009						
1.	On-the-job safety and labor legislation	Managers and specialists of enterprises and organizations of all forms of ownership on the issues of on-the-job safety	6	193	full-time education	1 week
2.	Business Planning	Managers and specialists of planning and economic departments	1	15	full-time education	1 week
3.	Computer operator	Specialists with higher and secondary education, working on PC	5	49	part-time education	4 weeks
4.	Computer graphics	Specialists with higher and secondary education, employed in the field of design	3	38	full-time education	4 weeks
2010						
5.	Computer operator	Specialists with higher and secondary education, working on PC	3	34	part-time education	3 weeks
6.	On-the-job safety and labor legislation	Managers and specialists of enterprises and organizations of all forms of ownership on the issues of on-the-job safety	7	208	full-time education	1 week
7.	Computer graphics	Specialists with higher and secondary education, employed in the field of design	3	27	part-time education	2 weeks
8.	Organization and management of joint households	Managers of multi-dwelling unit	3	101	part-time education	2 weeks

1	2	3	4	5	6	7
9.	Methodology and technology for creating e-learning tools	Academic teaching staff of EI «VSTU»	3	41	part-time education	2 weeks
10.	1C: Accounting	Specialists of accounting and economic divisions of the enterprise	1	11	part-time education	2 weeks
11.	Specialists accounting and economic divisions of the enterprise	Specialists with higher and secondary education, employed in the field of design	1	15	full-time education	5 weeks
12.	Business planning	Managers and specialists of planning and economic departments	1	13	full-time education	1 week
13.	Modern techniques for clothing and footwear production	Employees and civil staff (economists, inspectors, specialists, engineers and others responsible for providing clothing and equipment units of the Department of the Ministry of Interior)	1	14	full-time education	1 week
2011						
14.	Development, implementation and training for QMS certification in accordance with standard STB (Standards of the Republic of Belarus) ISO 9001-2009	Employees and staff of educational institutions (universities, colleges, lyceums)	1	39	part-time education	2 weeks
15.	On-the-job safety and labor legislation	Managers and specialists of enterprises and organizations of all forms of ownership on the issues of on-the-job safety	8	232	full-time education	1 week
16.	1C: Accounting	Specialists of accounting and economic divisions of the enterprise	1	11	full-time education	2 weeks
17.	Industrial security	Responsible ones for the security and maintenance of crane operation and lifting facility	1	8	full-time education	2 weeks
18.	Computer operator	Specialists with higher and secondary education, working on PC	1	14	part-time education	3 weeks

1	2	3	4	5	6	7
19.	Basics of three-dimensional computer modeling	Specialists with higher and secondary education in the field of computer-aided design	1	11	part-time education	2 weeks
20.	Oganization and management of joint households	Managers of multi-dwelling unit	2	34	part-time education	1 week
21.	Marketing Technologies of Successful Sales	For the marketing managers, marketing departments, foreign economic relations	2	35	full-time education	1 week
22.	Modern techniques for garments manufacture	Production and technical staff (masters, engineers, technologists) for republic unitary clothing production enterprises and extra workshops of the Ministry of Interior penalty system of Republic Belarus	1	28	full-time education	1 week
23.	Industrial safety	Responsibility for the security and maintenance of crane operation and lifting facility	1	8	full-time education	1 week
24.	Computer Information Technology	Specialists with higher and secondary education, employed in the field of design	1	14	full-time education	2 weeks
25.	Business planning	Managers and specialists of planning and economic departments	1	16	full-time education	1 week
26.	Crisis management	Temporary (crisis) managers in the proceedings on economic insolvency (bankruptcy)	1	13	full-time education	1 week
2012						
27.	On-the-job safety and labor legislation	Managers and specialists of enterprises and organizations of all forms of ownership on the issues of on-the-job safety	11	340	full-time education	1 week
28.	Garments design using CAD	Production and technical personnel of enterprises garment industry	1	1	full-time education	1 week
29.	Methodology and technology and the creation of electronic learning tools	Academic teaching staff of EI «VSTU»	1	14	full-time education	1 week

1	2	3	4	5	6	7
30.	Organization and management of staffing company	Managers and specialists of HR department	1	64	full-time education	1 week
31.	Organization and management of joint households	Managers of multi-dwelling unit	1	8	full-time education	1 week
32.	Basics of business and entrepreneurship	A wide range of listeners	1	14	full-time education	2 weeks
33.	English	Students of all department EI "VSTU"	1	11	part-time education	8 weeks
34.	Three-dimensional modeling and preparation of design documentation (based on KOMPAS-3D)	Engineering and technical personnel of enterprises of mechanical engineering, instrument engineering and light industry	1	13	part-time education	3 weeks
35.	Accounting in joint households	Accountants in joint households	1	17	part-time education	4 weeks
37.	Business planning	Managers and specialists of planning and economic departments	1	15	full-time education	1 week
38.	State Energy Supervision	State inspectors on Energy Supervision	1	13	full-time education	1 week
39.	State Energy Supervision for heat-settings, heat networks of consumers and power supply companies	State inspectors on Energy Supervision	1	9	full-time education	1 week
40.	Drawing and computer modeling in KOMPAS-3D	Teachers of secondary schools, gymnasiums, lyceums, colleges and teachers colleges	1	8	part-time education	1 week
41.	English	Students of all departments EI "VSTU"	1	14	part-time education	2 weeks
42.	Marketing Technology of Successful Sales	Head of Marketing, Sales, Foreign Economic Relations	1	19	full-time education	1 week
2013						
43.	On-the-job safety and labor legislation	Managers and specialists of enterprises and organizations of all forms of ownership on the issues of on-the-job safety	10	366	full-time education	1 week

1	2	3	4	5	6	7
44.	Modern techniques for garments manufacture	Technical industrial staff of garment production	1	2	full-time education	2 weeks
45.	Designing garments using CAD	Technical industrial staff of enterprises garment industry	1	2	full-time education	2 weeks
46.	Designing of garment stile	Technical industrial staff of enterprises garment industry	1	2	full-time education	1 week
47.	1 C: Accounting	Specialists of accounting and economic divisions of the enterprise	1	16	part-time education	3 weeks
48.	Fundamentals of computer modeling of three-dimensional (Autodesk Inventor)	Managers and specialists of enterprises and organizations of all ownership	1	15	full-time education	2 weeks
49.	Identification of textiles	Specialists with higher education, employed in the identification of textiles	1	1	full-time education	1 week
50.	Testing light industry production	Technical industrial staff of enterprises of light industry	1	3	full-time education	1 week
51.	DTP printing of publications (ADOBE INDESIGN)	For specials of printing industry	1	13	part-time education	3 weeks
52.	Business planning	Managers and specialists of planning and economic departments	1	17	full-time education	1 week
53.	Organisation and management of joint households	Managers in joint households	1	9	full-time education	1 week
54.	Computer graphics-based ASCON KOMPAS and AutoCAD	Specialists with higher and secondary education, employed in the field of design	1	16	part-time education	3 weeks
55.	Crisis management	Managers and specialists of planning and economic departments	1	29	full-time education	1 week

1	2	3	4	5	6	7
56.	Descriptive geometry	Training courses	1	13	part-time education	3 weeks
57.	Business English		1	10	part-time education	10 weeks
58.	Business English		1	12	part-time education	20 weeks
II Retraining Courses at the level of higher education						
2009						
1.	Banking	Higher education staff	1	26	part-time education	10 weeks
2.	Financial management in industry		1	20	part-time education	24 weeks
3.	Financial management in industry		2	64	correspondent education	22 weeks
4.	Financial management in industry		1	19	part-time education	10 weeks
5.	Software Information Systems		1	25	part-time education	10 weeks
2010						
6.	Financial management in industry	High education staff	2	59	correspondent education	22 months
7.	Financial management in industry		1	23	part-time education	10 months
8.	Information Systems Software		1	13	correspondent education	22 months
9.	Information Systems Software		1	14	part-time education	10 months
10.	Accounting and Control in Industry		1	32	correspondent education	22 months
11.	Economics and production management in the housing and communal services		1	26	correspondent education	22 months
12.	Expertise of consumer goods		1	13	correspondent education	22 months
13.	Banking		1	18	part-time education	10 months

1	2	3	4	5	6	7
14.	Banking	High education staff	1	29	correspondent education	22 months
15.	Graphic design		1	14	part-time education	10 months
2011						
16.	Financial management in industry	Persons with higher education	1	36	correspondent education	22 months
17.	Financial management in industry		1	24	part-time education	10 months
18.	Information Systems Software		1	12	part-time education	10 months
19.	Accounting and Control in Industry		1	36	correspondent education	22 months
20.	Economics and production organization in the housing and communal services		1	23	correspondent education	22 months
21.	Banking		1	36	correspondent education	22 months
2012						
22.	Financial management in Industry	Persons with higher education	2	56	correspondent education	22 months
23.	Financial management		1	26	correspondent education	20 months
24.	Accounting and Control in Industry		2	50	correspondent education	22 months
25.	Banking		2	47	correspondent education	22 months
2013						
26.	Financial management	Persons with higher education	3	83	correspondent education	20 months
27.	Accounting and Control in Industry		2	33	correspondent education	22 months
28.	Banking		2	74	correspondent education	22 months
	TOTAL in 2009-2013:		***148***	**3242**		

2. ANALYSIS OF THE EXISTING SYSTEM OF SPECIALISTS TRAINING AT MOGILEV STATE UNIVERSITY OF FOOD-STUFF

Qualification Improvement and Retraining Institute (QIRI) of educational institution "Mogilev State University of Food-stuff" (MSUF) was formed in 2003 with the purpose of the organization of postgraduate education for workers of the food, chemical and others industries.

QIRI provides the following:

- Retraining of managers and specialists with higher education;
- Training courses for managers and specialists with higher or secondary special education;
- Training, retraining and qualification improvement of employees;
- Training courses (thematic seminars, workshops, practical training, corporate training, and etc.).

QIRI proposes day, evening, correspondence and distance forms of courses for professions represented in the table 2.

Table 2 - Specialties of training courses in MSUF

Specialty	Qualification
Commercial activity in the market of consumer goods	economist
Accounting and Control in Industry	Accountant-economist
Fermentation Technology and wineproduction	Industrial engineer
The technology of chemical fibers	Industrial engineer
Technology of production of bakery, pasta, confectionery and food concentrates	Industrial engineer
Technology of storage and processing of milk and milk products	Industrial engineer
Technology of storage and processing of meat and meat products	Industrial engineer
Finance	Finance specialist
Examination of national consumption goods	Merchandiser

Training courses are held on topical issues for managers and specialists. Classes are given by qualified teachers of MSUF with extensive teaching experience, leading tutors from foreign universities are attracted if there is such need. In addition, the courses provide valuable guidance by professional practitioners of ministries and departments, as well as successful Belarusian and foreign enterprises.

The teaching process is accompanied by demonstration of exhibition samples of products, tastings, issuing handouts.

February 25, 2011 QIRI created Distance Learning Center to develop and implement distance learning technologies in education and to provide consumers with the most complete package of modern educational services.

March 14, 2014 QIRI had the first graduation of students of correspondence (e-learning) form of education, retrained in specialty, "Accounting and control in industry"

Afterwards, students received diplomas of retraining equal to the level of state standard higher education with qualification award.

The main objectives of the center are the creation of modern technological, research and information and communication environment for the implementation and support of the educational process with the use of e-learning technologies; organization of the educational process with the use of distance learning technologies; coordination of the work of the faculty to create a database of educational resources for educational purposes within the distance learning system using distance learning technologies; implementation of organizational methods and software and technical support of the educational process with the use of distance learning technologies; forming of the base of educational resources for educational purposes within e-learning system.

One of the main directions in the work of the center is to organize training courses on retraining specialties:

1-25 03 75 Accounting and control in industry;

1-25 04 71 Commercial activity in the market of large-scale consumer goods.

Specialists of the Center developed a computer program for creating electronic teaching materials in the disciplines (ETMD) and together with University teachers was developed the ETMD in the disciplines: foundations of Belarusian State Ideology; National Economy; money, credit, banks; legal regulation of economic activity; ethics and psychology of business communication; fundamentals of statistics, finance and financial management, and etc. ETMD were introduced in the educational process of retraining. The advantages of modern systems include the possibility of efficient organization of independent work and the promotion of learner's role in the process of education.

QIRI educational establishment "Mogilev State University of Food-stuff" provides educational training program for managers and specialists in full-time (day and evening) forms of education on the following topics:

— Automating of technological process and production of food (chemical) industry;
— automated processing of accounting and analytical information using 1C: Enterprise;
— accreditation of food laboratories;
— feed mill industry;
— confectionery;
— quality control of drinking water and water treatment;
— pasta production;
— microbiological methods of analysis of food products;
— equipment facilities for food (chemical) production;
— catering;
— responsible for the good condition and safe operation of vessels working under pressure, piping and valves ammonia refrigeration plants;
— responsible for the supervising of the technical condition of the vessels working under pressure, piping and valves ammonia refrigeration plants;
— milk processing;
— processing of raw meat;

— brewery;
— responsible for the good condition and safe operation of vessels working under pressure and process piping;
— responsible for supervising of the technical condition of the vessels working under pressure and process piping
— fruit and vegetable processing;
— alcohol manufacturing;
— chemical fibers manufacturing;
— fruit and grape wines manufacturing;
— technology chemical fibers;
— accounting, taxation and pricing;
— physicochemical methods of analysis of food products;
— bakery;
— food concentrates manufacturing;
— school meals;
— preschool nutrition.

The organization of educational training programs on other topics not mentioned is possible as well as according to the proposed by companies, including outside trainings on the premises of the customer to relevant technological, mechanical and economic profile of the food and chemical industry, catering and trade.

The quality management system complies with the requirements of QIRI ISO 9001-2009, DIN EN ISO 9001: 2008.

With the participation of the Department of Chemical Technology of Macromolecular Compounds (CTMC) MSUF in different time were organized courses of Retraining for such enterprises as "Belneftekhim" and "Bellegprom" (table 3).

Table 3 – Refresher courses conducted by the department HTVMS MGUP

Subjects courses	Premises	Period	Number of employees of enterprises trained
Finishing and dyeing technology	Educational Institution «Mogilev State University of Food-stuff»	22.11.2010 – 26.11.2010	13 people (JSC "Mogotex", JSC "Polesie", JSC "Sukno", JSC "Lenta")
Modern concepts of theoretical and technological foundations of polyacrylonitrile fibers	JSC "Naftan", "Polymir" factory	18.07.2011 – 22.07.2011	20 people
Modern technologies of production of chemical fibers	JSC "Mogilevkhimvolokno"	25.03.2013 – 06.04.2013	7 people
Modern technologies and equipment in the finishing manufacture	Educational Institution «Mogilev state university of food technologies»	18.11.2013 – 22.11.2013	16 people (JSC "Mogotex", JSC "Polesie", JSC "Sukno", JSC "Lenta", JSC "Vitebsk carpets")

3. ANALYSIS OF THE EXISTING SYSTEM OF SPECIALISTS TRAINING AT BELARUSIAN STATE ECONOMIC UNIVERSITY

In accordance with the Statute the University retrains personnel with higher education, improves qualification with secondary and higher education on the basis of Advanced Training and Retraining Institute of economic staff (hereinafter - ATRI), established pursuant to the Decree of the President of the Republic of Belarus from 25.05. 2000 № 293 "On measures to strengthen departmental control in the Republic of Belarus" according to the order of the rector of BSEU from 12.12.2000 № 653-A as a separate division "Advanced Training and Retraining Institute of economic staff ". According to Rector's order of BSEU from 10.02.2003 № 84 they changed the status of ATRI - it is defined as a structural unit of BSEU.

ATRI of economic staff

– retrains personnel with higher education on economic and legal professions (retraining faculty "Cousellingtradecentre");

- trains personnel with secondary and higher education in the educational areas: "Communication. Law. Economics. Management. Economics and Production Management "(schools " Right "," Economy "," Management "," Economics and Production Management", " Theory of education "(school" Theory of Education of Science ") (Retraining Faculty and specialized faculty of psychological and pedagogical training for teachers of economic disciplines).

The current organizational structure of the Institute is represented in the diagram 1. The main tasks of the advanced training system of BSEU are:

– well-timed meeting of the needs of national government bodies, local executive and administrative bodies, organizations, institutions, employment services for adults in further education of the advanced training for effective socio-economic development of the country, its national security, as well as for individual needs of the citizens to raise their professional level;

– exercise training of persons in reserve to fill leader positions in the areas of the Belarusian State Economic University;

– short courses and seminars on topical issues in the above areas;

– training of teachers of educational institutions of the republic on economic subjects;

– orghanization of international relations with foreign partners upon qualification improvement;

– training and professional training for higher and specialized secondary educated staff;

–organization of probation of representatives of organizations and enterprises;

– performance of applied research and other functions in the area of qualification improvement of staff.

For training in the retraining system of BSEU modern means of training are used, there are computer labs, classrooms equipped with multimedia equipment.

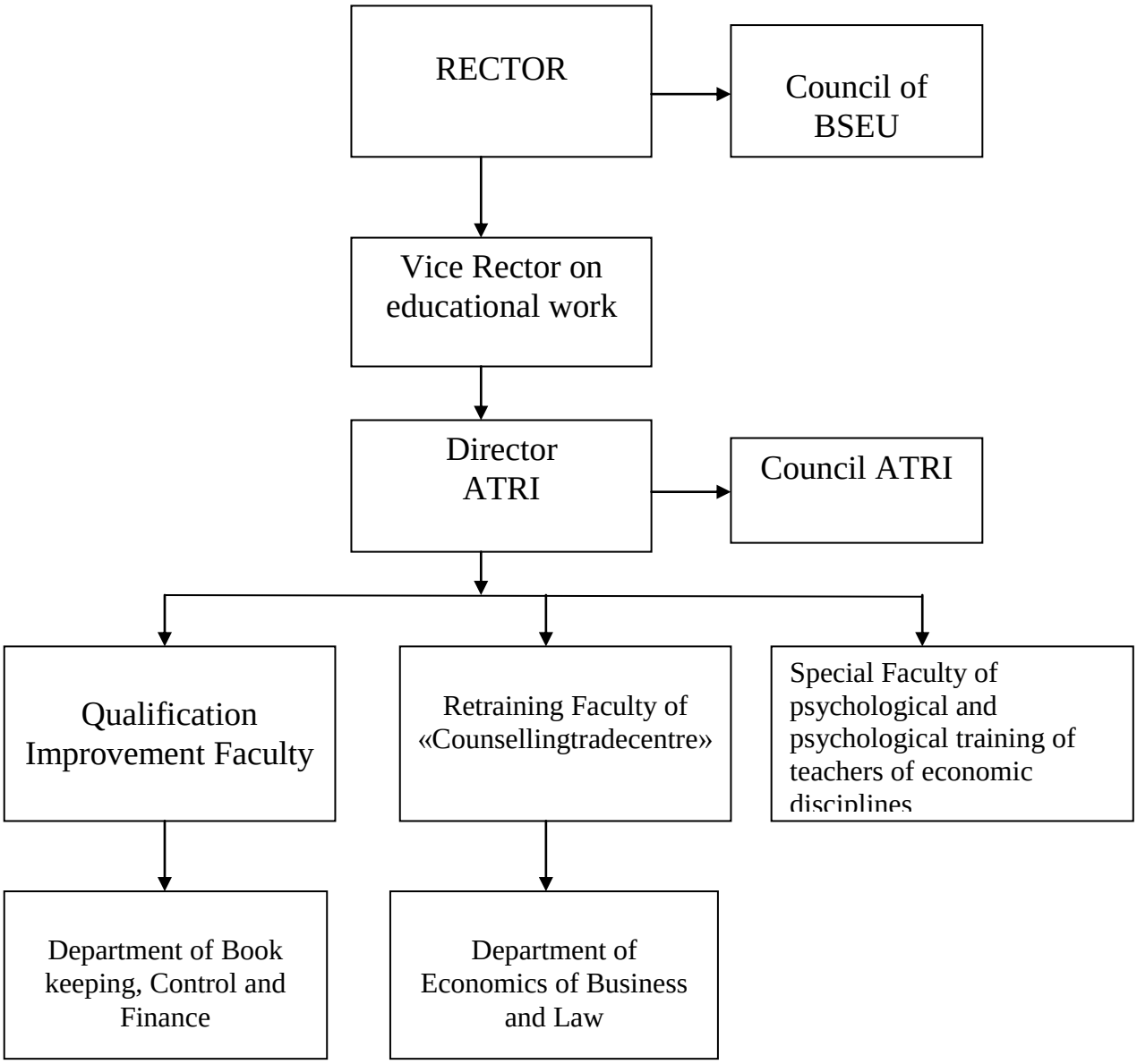

Diagram 1 - Organizational structure and management of ATRI of BSEU

All students of ATRI for the period of training (receiving educational services) can use the services of the library of the University, which has reading rooms, and a subscription book depository. The total collection of the library is presented with textbooks, manuals, guidelines, periodicals and consists of more than 1.3 million copies.

Most part of courses trained in BSEU is organized in accordance with the instructions of the Council of Ministers. These are:

– management in holdings with the participation of the state (the order of the Council of Ministers of the Republic of Belarus from 07.06.2012 № 11 / 209-145, article. 1.6.4.4.4 Minutes of the meeting of the Council of Ministers of the Republic of Belarus from 08.08.2012 № 3);

– labor rating (order of the Council of Ministers of the Republic of Belarus from 09.02.2008 № 30 / 225-255 on the enforcement of the decisions of the National Council on Labour and Social Affairs from 30.01.2008);

– Business Planning (Order of the Council of Ministers of the Republic of Belarus from 18.11.2006 № 39 / 225-2505,209-628 from 10.03.2008 № 39 / 225-389);

– government purchase (order of the Council of Ministers of the Republic of Belarus from 15.05.2010 №11 / 209-167);

– international economic relations and foreign economic activity (Order of the Council of Ministers of the Republic of Belarus from 30.12.2006 №1778 «On Amendments to the Regulation on students internship of higher educational institutions of Belarus and some issues of training, retraining and advanced training of specialists in foreign trade activities");

– organization and carrying out of trading on the futures commodity market (Order of the Coordinating Council on stock trading under the Council of Ministers of the Republic of Belarus from 23.04.2010 № 32 / 4article (item 16 of the minutes of the meeting) and the letter of the Ministry of Education of the Republic of Belarus from 28.05.2010 № 17 / 19 / i-394);

– WTO and trade policy in the Republic of Belarus (on behalf of the Interdepartmental Commission of the Council of Ministers of the Republic of Belarus on the questions of annexation (joining) of the Republic of Belarus to the World Trade Organization from 04.04.2012 № 31 / 3 article, letters from the Ministry of Education of the Republic of Belarus of 20.06.2012 № 17-03 / I -452 / 1);

– control (supervisory) activities of the bodies (training program, training and retraining of workers of control and audit services, as approved by the Minister of Education, Minister of Finance of the Republic of Belarus, the decision of the Ministry of Education of the Republic of Belarus from 30.07.2010 № 86).

Besides the mentioned areas on the faculty there are training courses for chief accountants and accountants of all kinds of enterprises, marketers, economists, managers and leading specialists of enterprises, there are workshops and seminars of different specialties, as well as training courses for exams and professional courses. Number of specialties since the establishment has grown from 5 to 16 so far (Table 4).

The demand for improvement of qualification is constantly rising: current trends are offered today, training-program of courses are being corrected, unclaimed directions are being closed.

For the period of existence of Advanced Training and Retraining Faculty there has been trained more than 18 thousand of students, including the enterprises of the industrial sector more than 7 thousand people.

Significant changes have taken place in the composition of students of training courses. Previously among students trained there were managers and specialists mainly of finance and accounting of different enterprises in various sectors of the economy, now to the above mentioned contingent we can add those of experts of business planning, logistics, public procurement, marketing, foreign trade policy and others.

Table 4 - Qualification Improvement areas of ATRI of BSEU for 2006-2014

Areas	2006	2007	2008	2009	2010	2011	2012	2013	2014 (9 months)	Grand total
Qualification Improvement of managers and specialists of Ministry of Taxes and Fees	540	660	420	269	294	329	240	120	90	2962
Qualification Improvement of departmental control (supervision) bodies	229	248	329	186	150	125	154	99	14	1534
Qualification Improvement of chief accountants			14			27	57	12	30	140
Qualification Improvement of accountants	140	43	96	73	113	71	38	50	25	649
Business planning and investment planning		191	136	105	95	65	50	22	15	679
Organization and labor rating				56	263	170	125	94	41	749
Public procurement					15	66	26	72	49	228
International standards of financial reporting							9			9
Management in Public Private holdings							21	9	8	38
Workforce management					14	9				23
International marketing			12	29	27					68
Industrial marketing			31	34	33	8		36		142
International investments and international economic activity of organizations			16		20					36
Logistics and price policy			35	11	30					76
Foreign Economic Activity	11	24	74	63	87	28	8	29	6	330

Continuation of table 4

Areas	2006	2007	2008	2009	2010	2011	2012	2013	2014 (9 мес.)	Grand total
Qualification improvement of teaching staff of economic disciplines in International Financial Reporting Standards	20	24								44
Promotion of Belarus perspectives in financial markets		12	12							24
Qualification improvement of managers of departments of MAZ plant							30	42		72
Preparation for the examination to get the power of public official in commercial companies	93	213	196	295	323	337	301	264	161	2183
Book-keeping	86	100	68	92	118	151	113	129	47	904
Workshops	169	100			41	9		36	19	374
Preparing for the exam for audit qualification	114	153	104	102	45					518
Customs registration	138	117								255
Procurement	45									45
Exchange trade		70								70
Training of the employees of the state statistics							30	30	25	85
Practical Management of business entity								17		17
WTO and measures to regulate international trade flows								61		61
Marketing software for sales									19	19
Grand total	1585	1955	1543	1315	1668	1395	1202	1122	549	12334

Availability in BSEU specialized departments with highly qualified personnel, material resources and ATRI allow to develop training areas in accordance with the needs of a particular customer and the economy in general. In the framework of its competence, teachers and students provides advice on the management of their own business.

Further training of managers and specialists are also in the official format upon the requests of organizations.

So, in 2013, department the managers, those included in the reserve for the further replacement of directors of trading houses of JSC "Minsk Automobile Plant", were trained in five areas, the representatives of JSC "August-white" enterprise took part in a master class "Master of production."

In 2014, a group of representatives of the Investigative Committee of the Republic of Belarus in Minsk was trained, a group of accountants of Republic unitary enterprise "Minsk Pharmacy", for OJSC "Integral" Further there were organized training courses "Marketing software sales" and others.

While organizing the learning process we take into account the interest of enterprises to their employees a minimum time out of work - training was conducted at the customer's premises.

Recently, the Faculty of Advanced Training and Retraining in conjunction with the departments of ATRI have developed and offered new directions to consumers of educational services, in particular:

– 4 qualification improvement courses ("Salaries and social security in a market economy," "Marketing software of sales", "Managerial competence of line executives", "Crisis Management: Enterprise Risk Management");

– 5 seminars ("exchange controls and currency legislation of the Republic of Belarus", "The use of Internet resources for the promotion of tourism products", "Risk management, time and stress management in business," "Accounting export-import and foreign exchange operations", "WTO Agreement on Trade Related Aspects of Intellectual Property Rights ").

The systematic organization of training demonstrates 10 years of experience and cooperation ATRI of economic staff and the Ministry of Taxation of the Republic of Belarus on the organization for specialists of Ministry of Taxation inspections. Moreover, in this work are directly involved the heads of all of the structural units of the central apparatus of the Ministry, which necessarily personally are involved in the development of educational and thematic plans and conducting of training sessions. There is also a three-year experience in organizing training for managers and specialists of state statistics, and in particular the National Statistical Committee of the Republic of Belarus.

The interaction algorithm with industrial-specific character which is being practiced can be adapted and can be the basis of the interaction between BSEU and consumers of educational services of training and retraining of personnel in economic forecasting, planning, management, coordination of work in the area of additional education of adults.

Qualification improvement in the Faculty is carried out in a full-time (day, evening) form of training 36-80 hours of training programs. In addition, widespread is such form as 1-2 day seminars with different themes, such as "Use of Internet resources for the promotion of tourism products", "Accounting export-import and foreign exchange operations" and others. The faculty also trains in accounting (in a volume of 200 teaching hours).

Qualification improvement of economic profile is developed on the basis of educational and thematic plans, training programs, which are agreed with the customer (the real sector businesses, small and medium business), concerned ministries and agencies (Ministry of Taxation, Ministry of Foreign Affairs, Ministry of Economy of the Republic of Belarus). Implementation of training programs allows the listeners to determine their level of development, see opportunities, prioritize and evaluate prospects, develop and expand the perception of specific economic area.

Upon completion of training at the training faculty students receive a qualification improvement certificate of national standard, upon the results of workshops, training courses, workshops they get a certificate of completion of training of national standard, certificate.

Specialists of different organizations with secondary or higher education can improve their qualification at training courses. Work experience does not matter, the exception is-training of persons to carry out the powers of the state representative in the management bodies of companies, stocks (shares) in the authorized funds belong to the Republic of Belarus or the administrative-territorial units, which requires a work experience of over 3 years.

To inform on possible options of training at qualification improvement faculty regular promotional activities are being carried out, in particular advertising agreements are being concluded in newspapers and on websites on a regular basis updated information on the website BSEU. Throughout the year, to maintain close ties with the consumers of educational services in terms of professional development of economy specialists through informing ministries and other government bodies, state organizations subordinated to the Government of the Republic of Belarus, as well as other stakeholders. In the 2014-2015 academic year, the faculty offers industrial training in specialized groups. Additionally, in the priority areas NewsLetter to different organizations are sent.

At the faculty the quality of the educational process is constantly monitored. After the course the students fill proposed questionnaire, the content of which is periodically reviewed and adjusted. The survey results are analyzed and communicated to teachers. Some measures to improve the level of teaching, the use of innovative teaching methods. Upon the results of the survey in the functioning of the quality management system the level of customer satisfaction was 90%. Information about the quality of educational services at selected areas is presented in Table 5.

Faculty conducted a market analysis showed the demand for educational services and corporate interactive forms of learning, the appropriateness of which can be explained by the presence of an individual approach in the preparation and evaluation of the skills of future students, as well as the possibility of actually learning on the job, in the workplace. It is also possible further support in the form of seminars 1-2 times per year.

The transition to lifelong learning as the supplementary adult education can take place through the introduction of a modular system, involving a systematic approach that allows skilled specialist socially adapt in a constantly changing situation at the labor market through the implementation of individual educational trajectory, including substantive training 1-2 times in five years.

Promising methods of organizing training may also include the development of flexible systems of interaction with businesses through the organization of corporate universities (the

conclusion of contracts for advanced training of specialists from medium to senior management with organizations-customers of education services).

Table 5 - Results of the survey of students (in credits, the maximum is 5).

Criteria for evaluation	Fields of study			
	Labor norming	Marketing support of sales	Business planning	Foreign economic activity
The quality of educational services	4,7	4,9	4,8	5
Professionalism and competence of teachers	5	5	4,8	5
Methods and information support	4,4	4,8	4,5	4,5
The use of innovative educational technologies	4,2	4,5	4,8	4,7
The organization of the educational process	4,5	4,4	4,5	4,6
Responsiveness to customer needs	4,6	4,4	4,5	4,5
Availability, completeness and accuracy of the information about the university	4,5	4,5	4,4	4,5

Overall, ATRI of economic specialists of BSEU occupies its own particular niche in the system of additional education of adults and provides quality training on the various relevant areas of training and retraining of economic specialists. Priority directions in the activity the faculty of training and retraining considers the expansion of relationships with consumers of educational services, enterprises of the real sector of the economy, the expansion of departmental and corporate training, orientation on short-term seminars and workshops that improve the consumer's speed of new information comprehension.

4. NEEDS ANALYSIS FOR QUALIFICATION IMPROVEMENT FOR TEXTILE AND CLOTHING ENTERPRISES

4.1 Characteristics of survey participants

To assess the needs for qualification improvement there was carried out a survey (poll) specialists and administration staff of the following companies:

1. Textile companies:

1.1. Republic Unitary Textile Manufacturing Enterprise «Orsha Linen Mill» (Orsha).

1.2. JSC «Gronitex» (Grodno).

1.3. JSC «Polesie» (Pinsk).

1.4. JSC «Baranovichi Cotton Production Association» (Baranovichi).

1.5. JSC «Cloth» (Minsk).

1.6. JSC «Slonim Worsted and Spinning Factory» (Slonim).

1.7. JSC «Brest Carpets»

1.8. JSC «Belfa» (Zhlobin).

1.9. JSC «Kupalinka» (Soligorsk).

1.10. JSC «Bobruysktrikotazh» (Bobruisk).

1.11. JSC «Ales» (Minsk).

1.12. JSC "Svitanak" (Zhodino).

2. Garment companies:

2.1. JSC «Center of Fashion» (Minsk).

2.2. JSC «Elise» (Dzerzhinsk).

2.3. JSC «Comintern» (Gomel).

2.4. JSC «Vesnianka» (Mogilev).

There were interviewed 290 professionals (233 - textile companies, 57 - garment enterprises) and 17 business managers.

Questionnaires for specialists and managers of enterprises are presented in the appendix.

Most of the professionals questioned work in manufacturing workshops of the plants and technical (technology services) (Table 6).

The survey involved specialists of different ages having different professional experience (tables 7, 8).

Table 6 - Sphere of professional activity of survey participants

Answer	Textile enterprises	Garment companies	Grand total
manufacturing workshop of the plants and technical / technological services	57,1	70,2	60,3
departments of planning and estimating	37,7	26,3	34,9
others*	5,1	3,5	4,7

* - HR personnel and legal services

Table 7 - Age characteristics of survey participants

Answers	Textile enterprises	Garment companies	Grand total
20 – 25 years old	6,8	12,3	8,1
25 - 30 years old	16,9	15,8	16,7
30 - 35 years old	16,9	21,1	17,9
35 - 45 years old	27,1	28,1	27,4
more than 45 years old	32,2	22,8	29,9

Table 8 - Professional experience of survey participants

Answers	Textile enterprises	Garment companies	Grand total
less than 2 years	12,1	18,8	13,9
from 2 to 5 years	14,4	10,4	13,3
from 5 to 10 years	24,2	18,8	22,8
from 10 to 20 years	18,9	31,3	22,2
more 20 years	30,3	20,8	27,8

Herein three-quarters of those surveyed specialists work in this specialty (table 9). Most of the respondents have higher education (table 10), about 7.5% of the respondents have higher and secondary professional education.

Table 9 - The level of education of participants surveyed

Answer	Textile enterprises	Garment companies	Grand total
higher	70,4	62,7	68,5
incomplete higher	6,9	11,9	8,1
Secondary professional	22,8	25,4	23,4

Table 10 – Relation of positions of participants surveyed who received a degree in the speciality obtained (in one of the specialties obtained if more than one).

Answer	Textile enterprises	Garment companies	Grand total
Work in their specialty	75	84,2	77,3
Do not work in the specialty	25	15,8	22,7

Information on employment history of a specialist in the enterprise (table 11) differ from the information on the experience of their professional work. Increasing the share of employees in the company in the groups of "10 to 20 years" and "over 20 years" indicates that the education was received in the course of work by specialists in the enterprise or in the process of employment they changed the sphere of their activity.

Table 11 –Employment history in the enterprise of the participants surveyed

Answer	Textile enterprises	Garment companies	Grand total
less than 2 years	13,6	14,0	13,7
from 2 to 5 years	11,4	12,3	11,6
from 5 to 10 years	18,2	15,8	17,6
from 10 to 20 years	22,7	29,8	24,5
more 20 years	34,1	28,1	32,6

4.2 Attitude of the participants surveyed to qualification improvement, including e- learning

Despite the fact that the legal documents establish mandatory qualification improvement of company specialists not less than once in 5 years, every fifth respondent specialist believes that training should not be regular and should be done only as and when necessary (see table 12). Every third respondent noted that the frequency of training should be reduced to 1 to 2 times per year.

In addition, more than 60% of specialists, whose work experience is more than 5 years, argue that in the last 5 years, they have not improved their skills (table 13).

On the other hand, almost the same percentage of experts confirmed that in their professional work they sometimes had to deal with the problems for which it was necessary to improve their qualification (table 14).

Table 12 - The specialists ‘answers on the question: "How often do you think it is necessary to improve qualification?"

Answer	Textile enterprises	Garment companies	Grand total
1	2	3	4
at least once in 2 years	35,8	28,1	33,3
at least once in 5 years	41,5	57,9	44,7
at least once in 10 years	2,3	1,8	2,1
believe that qualification improvement should not be regular, and its necessity can only be associated with a change (extension) of the sphere of professional activity of a specialist	21,6	12,3	19,0
it is not necessary for a specialist to improve qualification	1,1	-	0,8

Table 13 - The specialists’ answers on the question: "Did you improve your qualification for the last 5 years?"

Answer	Textile enterprises	Garment companies	Grand total
yes	39,4	29,8	37,1
no	60,6	70,2	62,9

Table 14 - The specialists’ answers on the question: "Did you experience in your professional activity with the problems for which it was necessary to improve your qualification?"

Answer	Enterprise specialists’ answers			Managers’ answers
	Textile enterprises	Garment companies	Grand total	
yes	64	59,6	62,9	88,2
no	36	40,4	37,1	11,8

The obtained data contradict the results of a survey of managers of enterprises, according to which most of the qualification improvement training is carried out not less than once in 5 years. However, it should be noted that a substantial proportion of the managers also does not consider the regular training to be necessary (see table 15).

82.5% of the managers believe that the need for training does not dependent on the age of the specialist. More than 40% of the managers say that expediency of qualification improvement does not depend on the level of education of a specialist (table 16). However, the most appropriate, from the point of view of the managers, is training with professional experience of 2 to 5 years (table 17).

Table 15 - The managers' answers to the question: "How often do specialists of your company improve their skills?"

Answer	Percentage mention
at least once in 2 years	11,8
at least once in 5 years	64,7
at least once in 10 years	0,0
believe that qualification improvement should not be a regular, and its necessity can only be associated with a change (extension) of the sphere of professional activity of a specialist	23,5
it is not necessary for a specialist to improve qualification	0,0

Table 16 - The managers' answers on the question: "Indicate the level of education of a specialist at which periodic training is most appropriate?"

Answer	Percentage mention
higher	17,6
higher or secondary professional	35,3
any (higher or incomplete higher or secondary professional)	41,2
depending on the field of activity	5,9

Table 17 - The managers' answers on the question: "Indicate experience in the profession in which periodic training is more appropriate?"

Answer	Percentage mention
less than 2 years	16,7
from 2 to 5 years	61,1
from 5 to 10 years	11,1
from 10 to 20 years	5,6
more than 20 years	5,6

About half of the respondents consider e-learning specialists to be an acceptable form of training (table 18). This relatively low percentage is explained by low awareness of companies specialists that confirmed the results of the survey. Enterprise managers increasingly allow for the use of this form of training for their employees. It can be explained as by more of their high awareness, so as by economic factors.

Table 18 - Answers to the question: "Do you consider for a specialist acceptable such form of qualification improvement as e-learning?"

Answer	Enterprise specialists' answers			Managers' answers
	Textile enterprises	Garment companies	Grand total	
yes	46,6	49,1	47,4	58,8
no	18,8	14,0	17,7	11,8
hard to answer, because am not aware about this form of training	34,1	36,8	34,9	29,4

For all groups of the respondents it is obvious that the main purpose of training is self-improvement in the professional activity (Table 19).

Almost 70% of the enterprise specialists' and more than 80% of the managers surveyed believe that the duration of the qualification improvement course on e-learning should not exceed 1 month (table 20). Almost half of the experts are ready to give further training up to 2 hours per day (table 21).

The vast majority of enterprise specialists believe that the responsibility for the payment of training courses should lie on the enterprise (table 22). However, only half of the enterprise managers agree with this. About 18% of the managers believe that the payment of these expenses by the enterprise is possible, but it must be carried out only if the company is interested in the training of this very specialist.

Table 19 - Answers to the question: "What is the purpose of qualification improvement for the enterprise specialists?"

Answer	Enterprise specialists' answers			Managers' answers
	Textile enterprises	Garment companies	Grand total	
Self-improvement in professional activity	71,9	76,2	72,9	94,1
Possibility of career growth	17,6	17,5	17,6	5,9
meeting management requirements	10,6	6,3	9,5	-

Table 20 - Answers to the question: "How much time a specialist can devote for qualification improvement during 1 year in the form of e-learning (on the job)?"

Answer	Enterprise specialists' answers			Managers' answers
	Textile enterprises	Garment companies	Grand total	
not more than 2 weeks	31,4	47,4	35,3	35,3
not more than 1 month	37,1	14,0	31,5	47,1
not more than 2 months	8,6	12,3	9,5	-
not more than 3 months	6,9	8,8	7,3	-
not more than 6 months	1,7	0,0	1,3	-
I am ready to learn continuously	5,1	7,0	5,6	17,6
I do not have time for training	3,4	5,3	3,9	-
your answer	5,7	5,3	5,6	-

Table 21 - Specialists' answers to the question: "How much time are you willing to devote to qualification improvement during the week for e- learning (on the job)?"

Answer	Textile enterprises	Garment companies	Grand total
not more than 1 hour	18,4	26,3	20,3
not more than 2 hours	47,7	42,1	46,3
not more than 4 hours	23,6	22,8	23,4
your answer	10,3	8,8	10,0

Table 22 - Answers to the question: "Who should pay training for qualification improvement of specialists of enterprises?"

Answer	Enterprise specialists' answers			Managers' answers
	Textile enterprises	Garment companies	Grand total	
only enterprise	84,7	93,0	86,8	47,0
specialist, improving his qualification should pay all the costs in full	0,0	0,0	0,0	0,0
training must be pay be a specialist, and the enterprise can compensate him part of the cost	13,0	7,0	11,5	35,3
your answer	2,3	0,0	1,7	17,7

4.3 Determination of the most popular training courses for qualification improvement

As part of the survey the specialists of the enterprises were proposed to choose 10 courses from the list, which specialists consider to be appropriate to study remotely. The list of the courses offered for e-learning was developed jointly by the teachers of Vitebsk State Technological University, Mogilev State University of Food-stuff and Belarusian State Economic University and included 74 courses.

Specialists of the enterprises had to rank the courses in order of decreasing interest in them (a score of 1 to 10, where 1 - most appropriate, 10 - less appropriate). However, as a result of processing a large number of profiles found inaccurate scoring. In connection with this, to identify the most popular course the frequency of their appearance in the questionnaire was determined.

As a result of the questioning there was made a rating that reflects the popularity of the courses offered to the specialists of textile and garment enterprises, presented in the table 23.

Table 23 - Rating of offered courses

Rating	Number in the questionnaire	Course title	University developer	Number of mentions
1	2	3	4	5
1	56	Salaries and social security in a market economy (modern approaches to stimulate labor in organizations)	BSEU	64
2	69	English language. Fundamentals of business communication and correspondence.	VSTU	61
3	50	Theoretical and practical aspects of labor costs settings in the textile and light industry	VSTU	53
4	43	Information support of marketing and commercial activities	VSTU	46
5	58	Marketing software sales (effective sales organization, the use of Internet technologies)	BSEU	46
6	68	Skills development for personnel management (clarification and systematization of issues for human resources)	BSEU	45
7	1	Modern equipment and techniques to evaluate the quality of raw textile materials and raw materials	VSTU	44
8-9	55	Organization and regulation of labor (development and introduction of standards)	BSEU	40
	59	Managerial competence of line managers (learning practical management)	BSEU	40

1	2	3	4	5
10-11	41	Modern approaches to improve the safety of facilities and equipment	MSUF	38
	54	Business planning and investment planning (methodology, requirements, characteristics and practices of business plans)	BSEU	38
12-14	67	Logistics and pricing policy (clarification and systematization of issues on the organization of the logistics of the organization)	BSEU	37
	63	Foreign economic activities of the organization (explanation and systematization of questions on foreign economic activity of the organization)	BSEU	37
	64	International Marketing (explanation and systematization of issues in the field of promotion of the organization's products to foreign markets)	BSEU	37
15-16	9	Information technology in the design	VSTU	34
	51	Efficiency of production and commercial activities of the textile industry	MSUF	34
17-18	65	Industrial Marketing (explanation and systematization of the issues in the field of trade policy of organizations in the domestic and foreign markets)	BSEU	33
	3	Features of modern equipment in spinning industry	VSTU	33
19	45	Counseling and legal system BiznesInfo	VSTU	32
20	2	Trends in the production of industrial textiles (technology and range)	VSTU	31
21-22	15	Computer-aided design of technological preparation of garment manufacture	VSTU	30
	19	Computer-aided design in AutoCAD	VSTU	30
23	13	Modern methods of final finishing of textile materials	VSTU	29
24	4	Features of modern equipment in weaving industry	VSTU	28
25-26	10	Design and designing of costumes and textiles	VSTU	27
	70	English. Professional vocabulary of textile production.	VSTU	27
27	14	Computer-aided systems of design in garment production	VSTU	26
28	52	Qualification improvement of chief accountants and accountants of budget organizations (improving qualification to meet the requirements of the legislation)	BSEU	25
29	5	Features of modern equipment in knitting industry	VSTU	24

1	2	3	4	5
30	46	Application packages for solving the problems of the economy	VSTU	23
31-32	60	Government procurement (procurement organization to meet the requirements of the legislation)	BSEU	21
	21	Modern aspects of the production of fibers and yarns textile industry	MSUF	21
33-36	66	International investment and foreign trade activities (explanation and systematization of issues to attract direct investment)	BSEU	19
	47	Methods and tools for Web-site promotion on the market of information services	VSTU	19
	18	Computer-aided design in the environment of Compass 3D	VSTU	19
	16	Energy conservation and energy management	VSTU	19
37-38	53	International Financial Reporting Standards: features and practice of introducing	BSEU	17
	28	Giving special properties of textile materials	MSUF	17
39-40	6	Features of modern equipment for the production of non-woven textiles	VSTU	15
	61	Practical management of business entities (updating of knowledge in the management and evaluation of business entities meeting current legislative requirements)	BSEU	15
41-42	48	Modern methods of content management Web-Site	VSTU	14
	12	Biotechnological processes in the finishing of textile materials (enzyme treatment)	VSTU	14
43-46	39	Methods of computer 3D modeling of hardware designing of industries	MSUF	12
	44	Application packages for project management	VSTU	12
	8	Development and design of complex structures of tissues	VSTU	12
	30	Modern technologies and mechanization of Dust Removal	MSUF	12
47-49	71	English. Professional vocabulary for garment industry.	VSTU	11
	7	Computer Aided Design of fabrics	VSTU	11
	11	Intensification of chemical and textile finishing production processes	VSTU	11
	17	Computer-aided design in SolidWorks	VSTU	10
	72	German. Fundamentals of business communication and management of correspondence	VSTU	10
	20	Modern aspects of the production of yarns and fabrics for industrial purposes	MSUF	10

1	2	3	4	5
47-49	34	Theoretical and practical aspects of air conditioning	MSUF	10
54-55	62	WTO and regulatory measures of trade flows (explanation and systematization of trade policy issues in the WTO)	BSEU	9
	22	Modern aspects of the production of fibers and yarns of special purposes	MSUF	9
56-58	40	Planning of experimental research and processing of results	MSUF	8
	33	Combining power technology in enterprises	MSUF	8
	49	Modeling of control systems in the organization environment Business Studio	VSTU	8
59-61	25	Modern hardware design processes for nonwovens	MSUF	7
	27	Theoretical aspects of preparation and coloring of textiles	MSUF	7
	42	Environmental aspects of processes for production of fibrous and film materials	MSUF	7
62-64	29	Evaluation of coloristic properties of textile materials	MSUF	6
	57	Management in holdings with the participation of the state (the systematization of the creation and effective functioning of the holdings in the current economic conditions)	BSEU	6
	26	Practical aspects of preparation and coloring of textiles	MSUF	6
65-66	31	Modern circuits and equipment of systems of recycled water supply of heat exchangers	MSUF	5
	36	Practical aspects of the calculation and selection of the pulling equipment (blowers, heaters, water pumps, etc.)	MSUF	5
67-68	74	German. Professional vocabulary for garment industry.	VSTU	4
	73	German. Professional vocabulary of textile production.	VSTU	4
69-71	24	Modern hardware design processes for obtaining and processing of industrial yarns	MSUF	3
	35	Heat and mass transfer processes (drying) in the textile industry	MSUF	3
	38	Theoretical and practical aspects of the calculation of heat exchangers	MSUF	3
72	32	Bases of safe operation of industrial refrigeration plants	MSUF	2
73	37	Theoretical and practical aspects of selection of devices with different types of mixers	MSUF	1
74	23	Modern aspects of the production of fiber and film materials for medical purposes	MSUF	0

5. NEEDS ANALYSIS FOR QUALIFICATION IMPROVEMENT SPECIALISTS OF THE COMPANIES PRODUCING CHEMICAL FIBERS AND YARNS

5.1 Characteristics of survey participants

To assess the needs for qualification improvement a survey (poll) of specialists and managers of the following companies was carried out:

- JSC «Mogilevkhimvolokno»;
- JSC «Grodno Nitrogen» PTC «Khimvolokno»;
- JSC «Naftan» plant «Polymir»;
- JSC «SvetlogorskHimvolokno»;
- PSUE «Yurteks»;
- PSUE «Bel-tex»;
- PSUE "White Russia".

On the whole there were interviewed 110 professionals and managers of 8enterprises.

Questionnaires for specialists and managers of enterprises are presented in the appendix. Most of the interviewed professionals working in manufacturing plants and technical (technological services) (Table 24).

Table 24 - The sphere of professional activity of survey participants

Answers	Number of answers, %
manufacturing workshops of plants and technical / technological services	87,3
departments of economics	6,4
others*	6,4

* - personnel officers and legal services.

The survey involved specialists of different ages and with different professional experience (Tables 25 and 26).

Herein the vast majority of specialists surveyed (87.3%) work in this specialty (Table 27), which is 10% more than for textile and garment enterprises. The overwhelming majority of the respondents (97.3%) have higher education (Table 28). Only 7% of respondents have incomplete higher or secondary professional education. At the same time, the share of workers with secondary professional education in the enterprises of "Bellegprom" was higher (23.4%).

Information on employment history of a specialist in the enterprise (table 29) differ from the information on the experience of their professional work. Increasing the share of employees in the company in the groups of "10 to 20 years" and "over 20 years" indicates that the education was received in the course of work by specialists in the enterprise or in the process of employment they changed the sphere of their activity.

Table 25 - Age characteristics of survey participants

Answer	Number of answers, %
20 – 25 years old	2,7
25 - 30 years old	7,3
30 - 35 years old	26,4
35 - 45 years old	53,6
more 45 years old	10,0

Table 26 - Professional experience of survey participants

Answer	Number of answers, %
more 2 years	3,6
from 2 to 5 years	10,0
from 5 to 10 years	15,5
from 10 to 20 years	26,4
more 20 years	31,8

Table 27 – Relation of positions of participants surveyed who received a degree in the speciality obtained (in one of the specialties obtained if more than one).

Answer	Number of replies, %
Work in their specialty	87,3
Do not work in the specialty	12,7

Table 28 - Educational level of participants surveyed

Answer	Number of replies, %
higher	97,3
incomplete higher	0,9
Secondary professional	1,8

Comparative analysis of the ratio employees of enterprises of "Bellegprom" and "Belneftekhim" in the nomination "The experience of work in the company" showed that the proportion of employees with experience less than 5 years was more in textile and garment enterprises, with experience more than 10 years - in chemical plants.

Table 29 - Work experience in the enterprise of the participants surveyed

Answer	Number of answers, %
less 2 years	3,6
from 2 to 5 years	7,3
from 5 to 10 years	15,5
from 10 to 20 years	34,5
more 20 years	39,1

5.2 Attitude of participants surveyed to qualification improvement, including through e-learning.

Despite the fact that the legal documents establish mandatory qualification improvement of company specialists not less than once in 5 years, every fifth respondent specialist believes that training should not be regular and should be done only as and when necessary (see table 30). Every third respondent noted that the frequency of training should be reduced to 1 to 2 times per year.

Table 30 – Specialists' answers to the question: "How often do you think it is necessary to improve their skills?"

Answer	Number of replies, %
at least once in 2 years	29,1
at least once in 5 years	50,9
at least once in 10 years	0,9
believe that qualification improvement training should not be a regular, and its necessity can only be associated with a change (extension) of the sphere of professional activity of a specialist	19,1
is not necessary to improve qualification of specialists	0,0

In addition, about 60% of specialists questioned, whose work experience is more than 5 years, argue that in the last 5 years they have not improved their skills (Table 31). When answering the last two questions textile workers and chemical companies have given almost unanimous responses.

On the other hand, ¾ of the specialists surveyed (for textile companies this figure is somewhat less) confirmed that in their professional activity they had to deal with the problems for which it was necessary to improve qualifications (Table 32). In the opinion of the managers of the plants, all the problems that arise in the workplace require higher skills of the specialists. In the case of textile and garment enterprises the proportion of affirmative answers is somewhat smaller (88.2%).

Table 31 - Responses of the experts to the question: "Did you improve your qualification in the last 5 years?"

Answers	Number of answers, %
yes	41,1
no	58,9

Table 32 - Answers of the specialists to the question: "Have you come across in your professional activity with the problems for which it was necessary to improve your qualification?"

Answer	Enterprise specialists' answers	Managers' answers
yes	75,5	100,0
no	24,5	0,0

The obtained data contradict the results of a survey of the managers of enterprises, according to which 75% of the training is carried out not less than 1 time in 5 years. Moreover, this figure is similar to the situation in the textile and garment enterprises. It should be noted that a small proportion (12.5%) or leaders did not consider it necessary to regular training, or believes that the frequency of training depends on the specifics of the work performed by a specialist (Table 33).

Table 33 – Managers' answers to the question: "How often do your specialists improve their qualification?"

Answer	Number of answers, %
at least once in 2 years	25,0
at least once in 5 years	50,0
at least once in 10 years	0,0
believe that training should not be a regular, and its necessity can only be associated with a change (extension) of the sphere of professional activity of a specialist	12,5
It is not necessary to improve qualification of specialists	0,0
your answer (periodicity of qualification improvement depends on the specifics of the work performed by a specialist)	12,5

100% of managers said that the need for training does not dependent on the age of the specialist. The majority of managers (87.5%) say that the most appropriate training is for specialists with higher education (Table 34), while the figure for textile enterprises is much lower. Such a situation may be due to the fact that chemical plants as the greatest responsibility as for the adoption of innovative, innovative solutions, and for the solution of

current technological problems lies with the engineering and technical personnel. Most appropriate in terms of 62.5% of the managers, is training those with professional experience of 5 to 10 years (Table 35). A third of the respondents called it the period of 2 to 5 years. Comparative analysis of these results showed that the textile enterprise managers consider to be the most appropriate for training experience a period of 2 to 5 years. This difference may be due to the fact that, in the opinion of leaders of chemical plants, young professionals who have recently completed their studies in the universities, have knowledge about new technology, advanced equipment and their main task is to acquire practical skills. At the same time, more experienced with the application point of view of experts (with experience of more than 5 years) to some extent, "behind" from the current situation in the field of polymer synthesis and processing of fibrous materials and they need to eliminate these "gaps" through qualification improvement training.

Table 34 – Managers' answers to the question: "Indicate the level of education of a specialist at which periodic qualification improvement training is most appropriate?"

Answer	Number of answers, %
higher	87,5
higher or secondary professional	12,5
any (higher or incomplete higher or secondary professional)	0,0
depending on the field of activity	0,0

Table 35 – Managers' answers leaders on the question: "Indicate the work experience in the profession in which periodic training is most appropriate?"

Answer	Number of answers, %
less 2 years	0,0
from 2 to 5 years	37,5
from5 to 10 years	62,5
from 10 to 20 years	0,0
more 20 years	0,0

Only a third of respondents consider e-learning of specialists to be acceptable form of training (Table 36). This relatively low proportion can be explained by low awareness of the specialists of enterprises which the survey results confirmed. Managers of chemical companies largely (compared to its employees, as well as with leaders of textile and garment enterprises) allow the use of this form of training of their employees. It can be explained as by their higher awareness and by more favorable economic factors of such form of qualification improvement training.

Table 36 - Answers to the question: "Do you consider e-learning form of professional development to be acceptable?"

Answers	Enterprise specialists' answers	Managers' answers
yes	35,5	87,5
no	29,1	12,5
hard to answer, because am not aware about this form of training	35,5	0,0

For all groups of the respondents it is obvious that the main purpose of training is self-improvement in professional activities (Table 37). And in this respect the views of employees and managers of chemical and textile enterprises practically coincided.

Table 37 - Answers to the question: "What is the purpose of qualification improvement training for the enterprise staff?"

Answer	Enterprise specialists' answers	Managers' answers
Self improvement in professional activity	76,9	87,5
Career opportunities	10,7	12,5
Compliance with management	12,4	0,0

Almost half of the staff surveyed and 75% of the managers believe that the duration of distance training should not exceed one month (Table 38). More than half of specialists (68.2%) are ready to spend on training up to 2 hours per day (Table 39), which is almost identical to the situation in textile and garment enterprises.

Table 38 - Answers to the question: "How much time can a specialist spend on further distance training during 1 year (staying on the job)?"

Answers	Enterprise specialists' answers	Managers'Answers
not more than 2 weeks	25,5	50,0
not more than 1 month	29,1	25,0
not more than 2 months	10,9	0,0
not more than 3 months	8,2	12,5
not more than 6 months	7,3	0,0
I am ready to learn permanently	10,9	0,0
I do not have time for trainings	5,5	0,0
your answer	2,7	12,5

The vast majority of the specialists and managers believe that the training courses should be paid by the enterprise (Table 40). If at first sight the situation is identical with the

respondents-specialists, in the case of managers the survey results differ. Thus, the administration of the textile enterprises in lesser degree (47%) is ready to bear costs associated with the payment of staff training courses, compared to the chemical industry (87.5%). This is due, apparently, to a better economic situation of "Belneftekhim"enterprises.

Table 39 – Answers of specialists to the question: "How much time are you ready to spend on distance training during the week (staying on the job)?"

Answer	Number of answers, %
not more than 1 hour	22,7
not more than 2 hours	45,5
not more than 4 hours	28,2
your answer	3,6

Table 40 - Answers to the question: "Who should pay for training specialists of enterprises?"

Answer	Enterprise specialists' answers	Managers'Answers
only enterprise	80,9	87,5
specialist, improving his/her qualification should pay all the costs in full	0,0	0,0
training must pay the expert, and the enterprise can compensate him part of the cost	16,4	12,5
your answer	2,7	0,0

5.3 Determination of the most popular training courses for qualification improvement

As part of the survey specialists of enterprises were asked to choose 10 courses from the generated list, which the specialists consider to be advisable to study remotely. The list of courses offered distance education was developed jointly by the staff of Vitebsk State Technological University, Mogilev State University of Food-stuff and Belarusian State Economic University and included 80 courses.

The specialists of the enterprises had to rank the courses in decreasing order of their interest in them (to score from 1 to 10, where 1 - more appropriate, 10 - less appropriate). However, as a result of processing a large number of profiles found inaccurate scoring. In connection with this, to identify the most popular course it was determined by the frequency of their appearance in the questionnaire.

As a result of questioning there was created a rating that reflects the popularity of the courses offered among the experts of the enterprises filamentary materials manufacture shown in Table 41.

Table 41 - Rating of offered courses

Rating	Number in the questionnaire	Course title	University developer	Number of mentions
1	2	3	4	5
1	75	English. Fundamentals of business communication and doing correspondence	VSTU	43
2	13	Modern aspects of fibers and yarns manufacture for textile purposes	MSUF	41
3 - 4	12	Modern aspects of yarns and fabrics manufacture for industrial purposes	MSUF	40
	14	Modern aspects of the fibers and yarns manufacture for special purposes	MSUF	40
5	9	Modern aspects of polyester fibers and yarns manufacture	MSUF	39
6	6	Theoretical aspects of chemical fibers, threads and films	MSUF	36
7	1	Promising source of raw materials and polymeric materials based on them	MSUF	31
8	5	Modern aspects of processing of fiber-forming polymers	MSUF	30
9-10	18	Modern hardware design of the processes for obtaining and processing of industrial yarns	MSUF	29
	74	Qualification improvement for personnel management (clarification and systematization of issues for human resources)	BSEU	29
11	16	Modern hardware design of the processes for obtaining of fibre- and film-forming polymers	MSUF	
12	65	Managerial competence of managers (learning management practices)	BSEU	
13	37	Modern approaches to improve the safety of facilities and equipment	MSUF	25
14	77	English. Professional vocabulary in chemical industry	MSUF	24
15	39	Modern equipment and techniques to evaluate the quality of textile material and of raw materials	VSTU	23
16	7	Modern aspects of the production of filamentary composite materials	MSUF	22
17 - 18	38	Environmental aspects of technological processes for filamentary and film materials manufacture	MSUF	20
	49	Efficiency of manufacture and commercial activity of chemical industry	MSUF	20
19 - 20	26	Energy-technological combination for chemical industry	MSUF	19
	45	Energy conservation and energy management	VSTU	19

1	2	3	4	5
21 - 22	20	Theoretical and practical aspects of coloring of filamentary materials	MSUF	18
	29	Heat and mass transfer processes (drying) in chemical and textile industries	MSUF	18
23	10	Modern aspects of polyamide fibers and threads manufacture	MSUF	17
24 - 28	11	Modern aspects of polyolefin fiber and film materials manufacture	MSUF	16
	17	Modern hardware design processes of processing of thermoplastic fiber-forming polymers	MSUF	16
	19	Modern hardware design processes for obtaining of nonwovens	MSUF	16
	22	Modern technology and hardware design of dust removal	MSUF	16
	36	Planning of experimental research and processing of its results	MSUF	16
29	67	Practical management of the companies (updating of knowledge in the management and evaluation of business entities with current legislative requirements)	BSEU	15
30 - 31	41	Features of modern equipment for the production of non-woven textiles	VSTU	14
	79	Modern aspects of robotics Enterprise Chemical Technology Profile	MSUF	14
32 - 36	21	Evaluation of coloristic properties of textile materials	MSUF	13
	31	Theoretical and practical aspects of the calculation of the devices with different types of mixers (mixers, reactors, etc.).	MSUF	13
	40	Trends in the production of industrial textiles for technical purposes (technology and range)	VSTU	13
	61	Organization and regulation of labor (development and introduction of standards in manufacture)	BSEU	13
	80	Modern aspects of thread mechanics	MSUF	13
37 - 40	35	Methods of computer 3D modeling of hardware design of industries	MSUF	12
	47	Computer-aided design environment in Compass 3D	VSTU	12
	48	Computer-aided design in AutoCAD	VSTU	12
	62	Salaries and social security in a market economy (modern approaches to stimulate labor organizations)	BSEU	12
41 - 44	34	Theoretical and practical aspects of the calculation of heat exchangers	MSUF	11
	51	Application packages for project management	VSTU	11
	71	Industrial Marketing (explanation and systematization of issues in the field of trade policy of organizations in domestic and foreign markets)	BSEU	11
	72	International investment and foreign trade activities (explanation and systematization of issues to attract direct investment)	BSEU	11

1	2	3	4	5
45 - 52	2	Theoretical and practical aspects of obtaining carbon-chain polymers	MSUF	10
	4	Modern aspects of natural polymers processing	MSUF	10
	8	Modern aspects of manufacture of filamentary materials based on natural polymers	MSUF	10
	32	Theoretical and practical aspects of the calculation of apparatus for separating of homogeneous mixtures (distillation, rectification, extraction, etc.)	MSUF	10
	53	Application packages for solving the problems of the economy	VSTU	10
	60	Business planning and investment design (methodology, requirements, characteristics and practices of business plans)	BSEU	10
	66	Government procurement (procurement organization to meet the requirements of the legislation)	BSEU	10
	70	International Marketing (explanation and systematization of issues in the field of promotion of the organization's products to foreign markets)	BSEU	10
53 - 58	3	Theoretical and practical aspects of obtaining hetero-polymers	MSUF	9
	24	Modern circuits and equipment of recycling systems of heat exchangers	MSUF	9
	50	Information support of marketing and commercial activities	VSTU	9
	64	Marketing software sales (effective sales, the use of Internet technologies)	BSEU	9
	69	Foreign economic activities of the organization (explanation and systematization of questions on foreign economic activity of the organization)	BSEU	9
	73	Logistics and pricing policy (clarification and systematization of issues on the organization of the logistics of the organization)	BSEU	9
59 - 63	15	Modern aspects of fiber and film materials manufacture for medical purposes	MSUF	8
	27	Theoretical and practical aspects of air conditioning	MSUF	8
	30	Practical aspects of the calculation and selection of the delivery of equipment (blowers, heaters, water pumps, etc.)	MSUF	8
	44	Modern methods of final finishing of textile materials	VSTU	8
	68	WTO and regulatory measures of trade flows (explanation and systematization of trade policy issues in the WTO)	BSEU	8
	23	The use of absorption water-salt thermo boosters in chemical and textile industries	MSUF	7
	28	Advanced technologies in the processes of grinding and classification (separation) of substances and materials	MSUF	7
	43	Biotechnological processes in the textiles finishing (enzyme treatment)	VSTU	7
	55	Modern methods of content management of a Web-Site	VSTU	7
	57	Theoretical and practical aspects of labor costs in textile and light industry	VSTU	7

1	2	3	4	5
	76	German. Fundamentals of business communication and doing correspondence.	VSTU	7
67 - 76	25	Bases of safe operation of industrial refrigeration plants	MSUF	6
	33	Theoretical and practical aspects of the calculation of various types of crystallizers	MSUF	6
	46	Computer-aided design in SolidWorks	VSTU	6
	52	Counseling and legal system BiznesInfo	VSTU	6
	56	Modeling of control systems in the organizationof environment Business Studio	VSTU	6
	59	International Financial Reporting Standards: features and practice of introducing	BSEU	6
	78	German. Professional vocabulary in chemical industry.	MSUF	6
77 - 78	54	Methods and tools for Web-site promotion in the market of information services	VSTU	5
	63	Management in holdings with the participation of the state (the systematization of the creation and effective functioning of holdings in the current economic conditions)	BSEU	5
79 - 80	42	Intensification of chemical and textile finishing production processes	VSTU	4
	58	Qualification improvement chief accountants and accountants cost accounting, budget organizations (improving of professional knowledge and skills to meet the requirements of the legislation)	BSEU	4

Analysis of the rating of the distance courses proposed shows that among chemical plants the most popular information is about modern aspects of manufacture of certain types of filamentary materials (excluding English language courses).

The least popular among the enterprises staff are courses related to:

- Various versions of information technology and computer modeling;
- Specialized issues of manufacture and quality control of the fiber products;
- Supporting processes in the chemical industries (energy, water, and air-conditioning etc.).
- Economic issues.

The resulting ranking of distance learning courses is probably connected with the peculiarities of the respondents, nearly 90% of whom work in manufacturing plants and technical / technological services.

6 E-LEARNING COURSES PLANNED TO DEVELOPE IN VITEBSK STATE TECHNOLOGICAL UNIVERSITY

6.1 BUSINESS ENGLISH FOR MANAGERS AND TECHNOLOGISTS OF TEXTILE INDUSTRY

The objective of the course – to learn practical English in the field of business communication, the expansion of regional geography and general cultural outlook, improvement and further development of knowledge and skills acquired at the end of training in accordance with the programs in the disciplines "Foreign Language" and "Foreign Language in the professional field ". During the development of the proposed program the specialists get acquainted with the culture of foreign-language oral and written communication in business relationships on the basis of the development of communicative, linguistic, socio-cultural and pragmatic competence. Communicative and linguistic competence are designed to encourage:

- Intelligent expansion of horizons specialist;

- Mastery of certain cognitive techniques to perform cognitive and communicative activities designed to produce results (conclusion of supply contracts, attracting foreign customers, scientific and practical cooperation, exchange of experience in the professional field of specialists from different countries);

- Development of skills for social interaction;

- The ability to improve continuously.

The content of the linguistic competence constitutes the basic knowledge of phonological, lexical, grammatical phenomena and the ability to use a foreign language in communicative and professional activities.

Sociocultural components requires knowledge and skill to take into account in a communicative and professional activities of regional geographic realities, national traditions, customs, accepted methods of communication in business relations, speech etiquette.

Pragmatic component provides the ability to apply in communicative and professional activity pragmatic parameters of the statements (adapt to the subject of the situation, the type of adressee, the conditions of the situation).

The tasks of the course:

- Vocabulary development, including in the field of business communication; training to audition authentic foreign speech in the field of business communication;

- Monologue speech training;

- Dialogue speech training through communication and with audio-video materials;

- Proper speech behavior training in situations of business communication in the volume of the subjects studied;

- Reading and interpretation of contemporary texts of business content.

The Content of the Discipline

Section 1. Fundamentals of Business Communication

1. Introduction. Speaking about myself. Dialogue «Nice to meet you». Text «Innovation and its inventor». Speech etiquette: interrogative sentences with the verb "to be".

2. Meeting appointment. Dialogue «When are you planning kick off meeting?». Text «An interview with the head of a worldwide organisation». Speech etiquette: interrogative sentences in the future tense. Grammar: Times Group Indefinite (Present-Future).

3. Talking on the phone. Dialogue «Call from the office». Text «Belarus to Europe. Culture gap? ». Speech etiquette: an apology. Grammar: Times Group Perfect.

4. The structure and history of the company. Text «Recollections of Mr. Bobrov ». Dialogue «Pros and cons of mergers». Speech etiquette: Questions in the past tense. Word formation: suffixes of nouns. Grammar: Times Group Indefinite (Present-Past), interrogative sentences in the past. Word formation: noun suffixes

5. Sales and sales promotion. Dialogue «How to promote your product?». Text «When is a world crises a problem?». Speech etiquette: Imperative in sentences. Grammar: numerals, adjectives to enhance the attractiveness of the goods.

6. Signing of contracts. Dialogue «An interview with an e-commerce entrepreneur». Writing of letters «Negotiate and discount». Text «Promise customer satisfaction». Speech etiquette: the expression of gratitude. Grammar: Times Group Continuous. (Present-Past).

7. Cash ratio (filling out the documents: invoices, way-bills). Text «Profit or principle?». Dialogue «Belarus linen: lower prices, higher sales». Grammar: "to be going to".

8. Market and the company. Text «Bellegprom. Natural objective to expand internationally». Dialogue «An interview with CEO of Mogotex». Word formation: conversion. Grammar: prepositions of place.

9. The price of the product, the formation of the cost. Text «Fashionable brands». Dialogue «Price of success». Grammar: Modal verbs. Word formation: adjective suffixes.

10. Competition. Text «Leadership of quality». Dialogue «Experience of the partnership». Grammar: Times Group Perfect Continuous.

11. Business correspondence. Text «Information letter». Dialogue «Replying to a formal invitation». Grammar: modal verbs equivalents.

12. Supply request. Clarification of the technical and financial issues. Text «Milavitsa underwear clothing». Dialogue «An interview with an expert on negotiating». Speech etiquette: expression of wishes. Word formation: adverbs suffixes.

13. Booking of the hotel. Organization of visits and meetings. Dialogue «Booking-confirmation». Text «Planning Agenda». Grammar: the passive voice, modal verbs in the passive voice.

14. Registration at the airport. Dialogue «Customs». Writing letters «Memo. Inform colleagues about the place of the meeting, and agenda ». Speech etiquette: explanation of the route to the destination. Text «Directions». Grammar: Semantic group of the verbs of motion and stay.

Section 2. Textile Terminology

1. **The raw material basement of the textile industry**. Cotton, wool, linen, chemical fiber, chemical yarn and abbreviations. Derivation: prefixation.

2. Test methods for textile materials. Physical and mechanical properties. Inevenness. Draw-backs of textile materials. Speech etiquette: Corrections of utterances. Grammar: pronouns.

3. **Technology and equipment of spinning.** Loosening, cleaning, blending, carding, stapling, combed, band, roving, spinning machines, torsion, texturing. Word formation: suffixes of the verbs.

4. Procedures and equipment for weaving. Warping, sizing, weaving machines. Weaving. Repetition of the grammar: passive constructions in business English.

5. Procedures and equipment for knitting. Components and parts of knitting equipment. Knitted weave. Grammar: countable and uncountable nouns.

6. **Finishing production.** Dyes and dyeing equipment. The final finishing of textile materials. Word formation: complex words.

7. Nonwovens. Methods for the production of nonwovens. Areas of application. Grammar: the degree of comparison of adjectives and adverbs

6.2. THEORETICAL AND PRACTICAL ASPECTS OF THE VALUATION OF LABOR COSTS IN TEXTILE AND CLOTHING INDUSTRY

Objectives:

- to show the audience that the modern enterprise is a complex, dynamic and open system, and the organization and regulation of labor within the system - a complex socio-technical and economic process in which the object of study is the person the subject of labor, tools and work environment;

- to help students learn the theoretical aspects of the mechanism of improving the organization and regulation of labor employed;

- to reveal the tools in the acquisition of practical skills in the field of research and analysis of the use of labor resources in the enterprise (organization, company), and the design of rational organization and regulation of labor employed;

- to encourage students to clearly realize that the modern worker is a person with a higher consciousness and new thinking, able to flexible adaptation to market conditions and the constant changes of the external environment.

Tasks - the development of professional competence in the field of:

- Theory and practice of the use of the theoretical and practical knowledge to modify the thinking which should be aimed at adapting to the market;

- The acquisition of skills to receive, process and analyze the existing enterprise (organization, company) mechanism to improve the organization of production and labor, increasing the efficiency of the labor force;

- The organization and regulation of labor in a particular enterprise, taking into account the characteristics and organizational and technical conditions of production

Content of the discipline

1. Nature, tasks and principles of work standards(regulation of labour). The essence of the problem and work standards in the enterprise. The system of norms of labor costs, the content and purpose. Requirements for the norms of labor costs and the basic principles of work standards

2. Labour standards and regulations in the manufacturing process. The concept of the production process, its content. Labor operations, its elements and their characteristics. Classification of standard materials. Working time and its structure.

3. Methods of valuation and scientific substantiation of labor standards. Characterization and classification of methods of work. Methods of work standards. Systems of microelement standards and their application.

4. Rationing of labor regulations in light industry. The structure of the rules of time and generation. Features of establishing of norms of labor costs for manual and machine-manual work.

5. Regulation of labor in the textile industry. The establishment of production standards work in spinning mills. The establishment of production standards work in the weaving industry.

6. The establishment of standards for auxiliary and other works. Regulation of labour auxiliary workers. Regulation of labour on automatic and semi-automatic production lines. Regulation of labour in instrumental processes.

7. The establishment of standards for managers, executives and employees. Regulation of labor managers, specialists and employees. Justification standards for time to rest.

8. Study of working time and the time of use of the equipment. Methods and techniques to examine the costs of working time of the executive. Chronometer observations and methods of data processing. Photo of working time, observation and treatment. Photorationing.

Test «Fundamentals of labor regulation »

6.3. MODERN METHODS AND EQUIPMENT TO EVALUATE THE QUALITY OF TEXTILES AND RAW MATERIALS

Discipline Program is designed for distance learning of textile organizations specialists, technical managers working in industrial laboratories, technical department, production departments.

The purpose of the discipline:

- learn how to evaluate the quality of textiles and raw materials in accordance with the requirements of the modern world;
- increase the competitiveness of products.

Tasks of the discipline:

- to study modern methods and approaches for assessing the quality of raw materials and semi-finished products;
- to study the principles of measurement and technical possibilities of modern laboratory equipment to evaluate the quality of textiles and raw materials;
- to be able to predict the properties of the finished products depending on the properties of the raw material.

Content of the discipline

Section 1. The methods and equipment to evaluate the quality of raw materials

1.1 Analysis of the influence of the basic properties of the fibers on the mechanical properties of yarn.

Basic notions about quality control of raw materials and yarn. Nomenclature of quality of raw material and yarn. Analysis of the influence of the basic properties of the fibers on the mechanical properties of yarn. The length of the fiber. Linear density. Breaking strength and elongation of the fibers. Fibers maturity. Micronaire and its relationship with the linear density of the fiber. Modern classification of cotton fiber. Units of measurement of fibers and yarns features and their conversion from the different systems.

1.2 Fundamentals of Mathematical Statistics in the processing of the test results.

Selective observation. Representativeness of the selection. Methods of sampling units for the selection. Random selection method. Mechanical method of selection. Selection of the number of tests. Statistics measurements of the test results. The average value. The variance, standard deviation, coefficient of variation. The calculation of the confidence interval. Statistically significant and non-significant differences between the results of the tests. Analysis of variance. Excluding extreme values. The overall coefficient of variation of intra and intergroup, the relationship between them.

1.3 Methods and equipment for evaluation of properties of raw materials.

Modern methods and tools used for quality control of raw materials in the laboratories of enterprises. Key-controlled properties of textile fibers, laboratory complex HVI. Determination of indicators of length cotton fibers. The content of short fibers. Unevenness of fiber length. Measuring principle micronaire. Determination of breaking force and elongation at break of the fibers. Determination of amount and composition of trash. Determination of the color of cotton fiber. Determination of the degree of maturity of cotton fibers. The index

of the fiber spinning stability SCI. Laboratory complex AFIS PRO. The principle of measurement of the length of the fiber, neps content, degree of maturity, the content of impurities. Compilation of assortments on the basis of data of laboratory tests. Stand-alone instruments for evaluation of fibers individual properties. Equipment for the evaluation of the properties of wool fibers.

Section 2. Methods and equipment for evaluation of yarn quality

2.1 Tester of unevenness of semi-product and yarn linear density.

Types of unevenness of spinning products. Causes of unevenness by linear density. Laboratory equipment for measuring of unevenness by linear density. Multifunctional complex to measure unevenness of the spinning products Uster Tester. Measuring principle of unevenness. Analysis charts of masses and local yarn defects (thin, thick places, neps). Analysis of the histograms of frequency distribution. Analysis of the spectrograms. Gradient of unevenness of spinning products. Establishing of the causes of the unevenness using kinematics schemes of spinning equipment. Measurement of hairiness. Factors influencing the yarn hairiness. Determination of foreign particles in the yarn. Predicting the appearance of fabrics and knitted fabrics depending on unevenness of the yarn. Contents of test reports. Evaluation of the technological process of spinning manufacture on the basis of information about the unevenness of spinning products.

2.2 Breaking force test for yarn.

Breaking characteristics of yarns and threads (absolute and relative breaking load, elongation at break, work break). Theoretical basis of the measurement of breaking load and elongation. Modern strength-testing machines with a constant rate of extension of the sample. Principle of operation and measurements of breaking characteristics on a strength-testing machine. Choosing of the preload. Analysis of the stress-strain diagram of spun yarn and filament yarn. Dashed chart. Bar graph of the frequency distribution of breaking load and elongation. Definition of the stretching module. Multi-cycle tests on fatigue performance of the thread (relaxation, hysteresis). Tests of yarn in skein. Testing by tapes and rovings for tenacity. The influence of various factors on the measurements of the breaking load and elongation (clamping length, velocity, conditional terms, the pre-tension applied clamps). Experimental studies of the breaking characteristics of filament yarn and complex chemical fiber. Relationship between breaking load and other properties of yarn. Relationship between breaking load and breakages on the looms and knitting machines. High speed breaking testing using a strength- testing machine USTER® TENSOJET 4. Contents of test reports. The advantages of high-speed testing.

2.3 Determination of twist, hairiness and friction properties of the yarn.

The influence of the yarn twist on the properties. Units of twist measurement. Selecting the required twist for different types of yarn. The principle of operation of modern twisting. Measurement of twist for different types of yarn (ring, rotor, compact, torsion). Unevenness of the yarn in twisting. Methods for determination of yarn hairiness. Device for determining of hairiness. The influence of hairiness on the properties of finished products. Frictional properties of the yarn. Method for determining the friction coefficient. Its value for further processing. Contents of test reports. The methods and materials used for the quality control process equipment. Classification of defects yarn.

2.4 Profile of yarn quality. Usage of the bulletins Uster® Statistics to evaluate the quality of the yarn.

Assigning the profile of yarn quality. Evaluation of the properties of yarn using the profile quality. What's bulletins Uster® Statistics. The importance of using newsletters Uster® Statistics to assess the quality of yarn and half-finished products. How to use the nomograms Uster® Statistics and electronic bulletin version. Key indicators Uster® Statistics 2013 Interpretation Uster® Statistics: a link between the different levels and the price of yarn. Evaluation of the quality of raw materials, semi-finished and yarn using bulletins Uster® Statistics.

Section 3. Methods and equipment for evaluation of the quality of fabrics and knitted fabrics

3.1 Innovative methods of studying of the structure and properties of textile materials.

Methods to study the structure of textile materials. Electron microscopy (transmission and scanning electron microscopy). Scanning probe microscopy. Spectral methods. Methods to study the mechanical properties of textile materials in terms of their dynamic operation.

3.2 Modern methods of evaluating of mechanical properties of textile materials.

The role of the mechanical properties of textile materials for textile production processes. Types of deformations arising in fibers, threads and articles. The characteristics obtained when a single tension material until breaking, modern apparatus and methods of their determination. Single-cycle tensile characteristics. Methods for their determination. Relaxometers. Features of repeated stretching and bending of textile materials. Phenomena of fatigue, its causes. Creasing, bending and twisting of textile materials. Modern instruments and methods of study and characterisctics. The rigidity of textile materials with various types of deformations. Factors affecting the rigidity of the materials, methods of study.

3.3 Current methods of evaluating of the physical and physico-chemical properties of textile materials.

Thermal characteristics of textile materials, the characteristic properties and methods of measurement. Electrical and dielectric properties of textile materials. Optical properties of textile materials (methods for the study) and characteristics. The dependence of moisture and other characteristics of the textile materials from the surrounding atmospheric conditions. The kinetics and equilibrium sorption. Methods for determining of absorbent properties. Methods for determining of the moisture content of textile fibers used in this apparatus for conditionally mass and the means for determining. Modern standard norms of humidity for different types of fibers and yarns. Water absorption, solubility, wetting quality and capillary of the products. The penetration of textiles. Breathability. Vapor permeability. Resistance to water. Absorption of the solid particles (dust holding capacity, contamination and etc).

3.4 Modern methods of assessing changes in the structure and properties of textile materials in the course of their operation.

Shrinkage of textile materials, types of shrinkage methods of its determination and the factors on which it depends. Wear and tear as a result of the combined action of various factors, individual factors (light, weathering, chemical exposure, abrasion, repeated

deformation, joint wear, attack by microorganisms). Mechanisms and criteria of deterioration. Modern laboratory simulation of wear, experimental wearing, using of features and devices. Specific types of wear: Peeling and etc. The effect of high and low temperatures on textile materials. The effect of chemicals on textile materials. The strength of coloring products to various physico-chemical effects. Striped fabrics and knitwear. Methods for evaluation of properties.

List of tests

1. Methods and equipment for evaluation of the properties of the fibers.
2. Methods and equipment for the evaluation of the properties of yarn.
3. Methods and equipment for evaluation of the properties of textile materials.

6.4. INFORMATION TECHNOLOGY IN THE DESIGN

The objective of the discipline study

Gaining knowledge about modern information technologies, principles of design of the objects in the information and virtual environment, methods of drawing in design using a two-dimensional vector and raster graphics. Ability to navigate in today's software that allows you to create a sketch of the project. Formation of professional competence in the field of information technologies in design.

Discipline task

- Familiarize with the modern, most popular software packages for CAD;

- Acquire and consolidate skills in the use of modern software package for work with vector and raster graphics. Study the basic principles of work with vector graphics;

- Study the basic principles of work with raster graphics;

- Familiarize with the methodology of implementation of successive stages of the development of conceptual projects in the virtual space;

- To give practical skills of creating quality design projects using appropriate programs; - To generate professional competence in the field of information technologies in design

The Content of the discipline

1. Vector graphics. Features for creating and editing vector graphics. Mathematical foundations of vector graphics. Advantages and disadvantages of the method of the vector representation of images. Graphic file formats and exchange between applications. Import and process-related graphics.

2. Raster graphics. Working with raster graphics. Advantages and disadvantages of a bitmap image representation method. Algorithms for image compression. Dimensions. Resolution. Interpolation. Principles scaling raster graphics.

3. Presentation of the colors. Human perception of the luminous flux. The color and light. Features color. Lightness, saturation, hue. Color models, color modes, color space. Additive and subtractive color model. Basic color models: RGB, CMY, CMYK, HSV. Color profiles.

4. CorelDraw Code. Familiarity with the interface. Review menu. Setting up the workspace document. The overall structure of the module settings. The structure of the document. Importing, exporting, saving and opening files.

5. Vector graphics objects. Classes of objects. Primitives and their properties. The concept of contours and shapes. Object attributes. Organization, streamlining and transforming objects. Grouping and association. Logical operations with figures.

6. Editing curves. Creating curves. The design of the curve. Types curves and nodes. Drawing and editing of curves. Operations with nodes of the curve. Controls properties of the line.

7. Ways and properties of filling pattern. Applying and editing of filling patterns and strokes. Styles colors. Single color filling (color model, the mixer, the palette)The Development of a custom palette. Gradient. Filling of the patterns. Development of the user pattern. Fill texture. PostScript texture. Creating and editing a style library colors.

8. The concept of the contour of the object. Attributes and properties of the contour. Saving proportionality.

9. Work with text. Artistic text. Simple text. The main properties of the text. Tools for working with text. Font Management. Formatting. Text effects. Additional tools to work with text.

10. The use of special effects. Types and basic settings of special effects. Tools: interactive flow of interactive loop, interactive distortion, interactive shell, interactive squeezing, interactive shadow, interactive transparency. Application and Setting special effects to the contours: zigzag, twisting, etc.

11. Layers Object Manager. Sample layer. Basic principles of work with layers. Organizing objects on layers. Sample layer.

12. Spot Image. Dot formation of the object and tracing of images. Bitmap effects. Masking of point objects, masking of colors. Using bitmaps in CorelDraw. Dot formation of vector objects, and application of special effects.

13. Creating and editing of a multi-page document. Settings pages. Brochure. Lodge. Vertical, horizontal booklet.

14. Adobe Illustrator. Interface and configure the workspace. Display modes. The structure of the document. Importing, exporting, saving and opening files.

15. Organization of objects. Move, rotate, align and transform of objects. Using a palette Transform. Create groups of objects. Compound path.

16. The contours, and datum. Study of methods for creating and editing vector curved contours.

17. Methods for creating of complex contours. Creating complex contours. Creating compound paths. Creating clipping masks. Pathfinder Palette.

18. Symbolic objects. Creating and editing character objects. Using a palette Symbols.

19. Spatial transformations and filters. Use of transforming tools.

20. Working with color. Use and edit colors and gradient fills. Palette of Color. Palette catalog Swatches. Color filters.

21. Gradient and decorative fillings. Blend. Creating and editing decorative fillings. Gradient mesh.

22. The transparency of the objects, blend modes. Applying of transparency effects. Opacity mask.

23. Working with layers. Create and edit layers. Palette Layers. Location and edit objects on layers.

24. Text. Creating and formatting of plain text. The text along the path. Block text. Study of the methods for creating and editing text blocks chain. Formatting of the text block.

25. Importing and exporting images. Exchange buffer Clipboard. Drag-and-drop Technology. Editing related objects.

26. Dot formation of images. Autorouting. Dot formation and processing of raster images. Applying filters to dot images.

27. Photoshop. Familiarity with Photoshop interface. Work area profile. Working with floating palettes. The structure of the document. Document Navigation. Saving and opening files.

28. Drawing and retouching tools. Palette tools for retouching and drawing. Capabilities and features of the tools. The parameters and properties of the tool.

29. Means of isolation. Features selection. Palette tools to highlight the field and their properties (manual selection tools). Quick Mask mode. Automatic allocation of funds. Alpha channels. Modification of the selection border. Methods of geometric operations with the selected area.

30. Working with Layers. The concept of layers. Operations with masks. Fine and adjustment layers. Layer Styles. Managing a range of mixing pixels. Mixing layers. Organizing objects on layers. Create groups of layers.

31. Operations with contours. The concept contours. Their purpose and properties. Vector shapes. Rasterization. Vector shapes and contours. Convert and edit loops, fill and stroke paths, conversion circuits.

32. Channel Management. The system of channels. Purpose and properties. Operations channels. Mixing channels.

33. Tonal and color correction. Color balance. Color operations. Using the histogram. Management level tones. Operations with the tone curve. Methods of correction of complex images. The tone curve as a tool of special effects.

34. Working with filters. Correction filters. Distorting filters. Special filters.

35. Work automation. Methods for automating operations. Recording operations. Batch processing of images. Smart-objects.

List of tests

1. Features of vector and raster graphics.
2. Graphic file formats.
3. Editing curves.
4. The attributes of objects.
5. Working with color.
6. Work with the text.
7. Masking objects.
8. Selection.
9. Tools retouching.
10. Channels.
11. Tone and color correction.

6.5. MODERN METHODS OF TEXTILES FINISHING

Developing in the last decade new approaches in textile finishing technologies require training of engineers-dressers, owning advanced technology, based on new physical, physico-chemical and biological principles, progressing in the basic sciences. The presented work program is designed for distance learning of engineering employees of finishing enterprises, as well as undergraduates and graduate students specializing in this area.

Purpose – To study the final finishing process of textile materials on the basis of environmentally friendly materials and methods, and the use of advanced domestic and foreign technology advances in the final finishing of textile materials. As a result of the discipline the student should **know**:

— modern methods of chemical, physico-chemical and mechanical processes of final finishing of textile materials;

— promising directions of scientific and technical progress in the final finishing of textile materials;

have skills:

— correctly and at high level of engineering to build a modern, environmentally safe, economically based technological processes of the final finishing of textile materials;

— to choose the right processing equipment for the final finish-specific structure and properties of the textile material.

Content of the discipline

Section 1. Purpose and classification of the main types of final finishes

1.1 The application area of textile materials and the requirements for the final finish. The main tasks of the final finish. Choosing a final form finishing textile material, depending on its properties, structure and function.

1.2 Classification of types of final finishes. The final finishing of general purpose. The final finishing of special purpose.

1.3 Means and methods of final finishing of textile materials. Mechanical and chemical processes of the final finish. Modern methods of polymer chemistry. Physical, mechanical impacts.

Section 2. Nanotechnology in the final finishing of textile materials

2.1. Making textile materials durable. Types of degradation of textile materials and the place of their origin. Making textile materials resistant to mechanical degradation. Chemodestruction and protection of textile materials from it. Ways to make fire-textile materials, thermally stable. Ways of lightstabilization of dyed textiles. The protection of textile materials against microorganisms.

2.2. Making textile materials shape stable. New drugs for shape stability. Creasing technology, little shrinkage finishes. Making finished products shape stable.

2.3. Making textile materials hydro- and oleophobic, chemical resistance, antistatic, dirt repellent. Using nanoemulsions and nanodispersions for final finishing of special purpose.

Section 3 Modern technologies of final finishing textiles from fibers of different nature

3.1. Finishing of textiles from cellulosic fibers. The final finishing of cotton textiles. The final finishing of linen fabrics. Decorating on calender machiness.

3.2. The final finishing of textiles made from wool. Mechanical operation of final finishing of woolen materials. Little shrinkage and felting finishes of wool finishing.

3.3. The final finishing of textile materials of chemical fiber. Specificity of final finishing textile materials from thermoplastic rayon and synthetic fibers. Selection of operations, modes and recipes for final finishing of textile materials of chemical fiber. The final finishing of textile materials, of a mixture of fibers.

3.4. Modern equipment for final finishing of textile materials.

Section 4 Biotechnology in textile finishing

4.1. Current state and prospects for the use of enzymes in the operations of the final textile finishing. Application areas of enzymes in textile finishing technologies.

4.2. General principles of the structure and action of enzymes. Specificity of action of hydrolases, amylases, proteases, their properties, structure. Function and properties of components multienzyme composition during processing cotton and linen materials.

4.3. Enzyme technology of final finishing of textiles from cellulosic fibers and wool. Prospects for the use of enzyme technology in textile finishing from cellulosic fibers. Features of technological regimes of Biopolishing and biosoftening.

Section 5 Intensification of finishing production

5.1. Chemical intensification of textile finishing. Chemical intensification of wool finishing. Influence of SAW and organic compounds on textile finishing processes.

5.2. Physical intensification of textile finishing. Foam finishing. Plasma-chemical technologies. Ultrasonic technology in the final finish. High-frequency effects in the processes of final finishes.

List of tests

1. Main tasks of final finishes.

2. Selection of the final finishing textile material, depending on its properties, structure and function.

3. Means and methods of final finishing of textile materials.

4. Principles and methods for improving the stability of textile materials to mechanical damage.

5. The method of making textile materials fire and thermo stable.

6. Features of proceeding of chemodestruction of cellulose and wool fibers.

7. Possibilities to improve shape stability of textile materials.

8. Ways to solve the problem of free formaldehyde in the technology and consumer.

9. Technology of water, oil, dirt-repellent finish.

10. Types and requirements for special purpose coupling agent.

11. Basic final finishing of cotton fabrics.

12. The types of calenders and types of effects of calendering.

13. Specificity of the final finishing of textiles made from wool.

14. Features of the final finishing textile materials from thermoplastic rayon and synthetic fibers.

15. Specificity of the final finishing of textile materials from a mixture of fibers.

16. Application areas of biotechnology in the finishing production.

17. Classification and properties of enzyme preparations for the textile finishing.

18. Enzymatic technologies of final finishing of textiles of cellulosic fibers and wool.

19. The ways of chemical intensification of the processes of textile finishing.

20. Use of foam technology in textile finishing.

21. The impact of electromagnetic waves of RF and microwave range onto the textile finishing process.

22. Plasma treatment of textile materials.

23. Future directions of technology of final finishing of textile materials of natural and chemical fibers.

7 E-LEARNING COURSES PLANNED TO DEVELOPE IN THE MOGILEV STATE UNIVERSITY OF FOOD-STUFF

7.1 MODERN ASPECTS OF MANUFACTURE OF FIBERS AND YARNS OF SPECIAL PURPOSES

The aim of the course - the expansion and updating of theoretical and practical knowledge of the workers in chemical industry in the production of fibers and yarns, special purpose to improve the efficiency of their professional activities.

Training courses introduce to the main directions of the development of special purpose fibers and yarns, at the present stage, physico-chemical and technological patterns of manufacture, properties and applications.

Objectives

As a result of the study program of training courses the student

must have an idea:

—the current state and prospects of development of manufacture of fibers and yarns for special purposes in the Republic of Belarus and the world;

—the achievements of science and technology in manufacture of fibers and yarns for special purposes;

—about the basic methods for producing fibers and yarns for special purposes, their strengths and weaknesses, areas of application.

must know:

—main types of fibers and yarns for special purposes;

—basic physical and chemical laws and technological processes of making yarns and fibers for special purposes;

—properties of fibers and yarns for special purposes;

—basic requirements for finished products;

—methods of analysis of the main technological characteristics.

The content of the program

Section 1. Physical modification of chemical fibers

Methods for modifying fibers and yarns: structural (physical), physico-chemical, chemical. Basic laws of structural modification. Regulation of the cross-sectional shape and the fiber surface topography (morphological modification), the linear density filaments and physico-mechanical properties of fibers and filaments, shape and fibrous structure (texture). Bicomponent fibers.

Section 2. Physico-chemical and chemical modification of chemical fibers

Basic laws of physical and chemical modification. Physicochemical mixing patterns via a common fiber-forming polymer and solvent melt. Compatibility of polymers. The role of "introductory" effects in the preparation of ultrafine fibers in the matrix of the auxiliary polymer. Compatibility of the polymers in the solid state. Structural changes in the spinning solutions and melts of polymers in dispersed introduction of fillers and pigments. Influence of additives on the highly physical and mechanical properties of the fibers and yarns. Flow charts dyeing fibers and filaments in the "weight".

Changing the primary structure of polymers and regulation of flexibility of macromolecules. Chemical modification. Effect of changes in the primary structure of fiber-forming polymers on their physicochemical properties. Varying of physicomechanical and physicochemical properties of the fibers and filaments by reactions and polymer-grafting reactions. The possibility of immobilizing of biologically and physiologically active substances and preparations, the prolongation of their actions. Giving thermal, chemo- and lightresistance of fibrous materials. Principles of Shin Goosen Technology.

The possibility to use laser irradiation to modify the polymer structure and properties of the fibers on their basis.

Section 3. Modification of polyester, polyamide and polyolefin fibers

Methods for modifying of polyester, polyamide and polyolefin fibers and filaments are structural (physical) realized without changing the primary structure of the spinning polymer macromolecules; physicochemical conducted with changing compositional polymer melts; chemical, implemented as a change in the primary structure of the macromolecules (by copolymerization or co-polycondensation) and changing the composition of the surface layers of the fiber by similar reactions and polymer-grafting reactions. Regulation of the cross-sectional shape, and surface texture relief fibers (morphological modification), the linear density filaments, the physico-mechanical properties of fibers and filaments. Structural changes in the spinning polymer melts when administered to disperse fillers and pigments. Influence of additives on the highly physical and mechanical properties of the fibers and yarns. Flow charts for dyeing fibers and filaments in the "weight". Changing the primary structure of polymers and macromolecules regulation flexibility, heat, and lightresistance of chemo- fibrous materials.

Technological features of synthesizing of the color (or structural-colored) fiber-forming polymers. Modification of synthetic fibers by mixing a general fiber-forming polymers via melt. Compatibility of polymers. Process for obtaining composite yarns principles of ultrafine fibers and a matrix-fibril structure ("M / F») from mixtures of polymer melts. Methods of chemical modification of polyester fibers: obtaining of little peelinged, low-melting, hydrophilic, antimicrobial, with improved dyeability, given shrinkage, flame, etc.

Section 4. Features of the synthesis and properties of small-capacity fiber-forming polymers, technological schemes of fibers on their basis

Polyester fibers based on polyalkylene terephthalates (PAT PAT): polimetilentereftalat (PMT, PMT); polypropyleneterephthalates (PPT, PPT) or polytrimethylene (PTT, PTT); polybutylene terephthalate (PBT, PBT); poly (butylene terephthalate-co-ethylene

terephthalate); polyethylene naphthalate (PEN, PEN). Technological schemes of fiber-forming PPT (PTT) and PBT. Properties and applications of the polyester fibers obtained by the above APM.

Section 5. Features of synthesis and properties of fiber-forming biodegradable polyesters, technological schemes of fibers on their basis

A brief historical sketch of the development of research in the field of synthesis of polyhydroxyalkanoates (PHAs). The main methods for the synthesis of PHA: polycondensation of hydroxycarboxylic acids, the polymerization of lactones, microbiological synthesis. The synthesis of high molecular of copolymers of various compositions.

The primary structure of the polyesters of this series. Molecular weight. The flexibility of the structure and the regularity of the ability of polymers to crystallize this series. Aggregation and phase transitions of PHA. The influence of the chemical structure of the elementary unit on the physico-chemical properties of PHA. The ability of polymers and copolymers based on to biodegradation of PHA. Possible applications for the production of PHAs fibers and other polymeric materials. Technological scheme and hardware design of the spinning process on the basis of PHA. Properties and application of the fibers and yarns based on PHA.

Section 6. Preparation of fibers and filaments of natural polymers based on

A brief historical sketch of the development of research in the field of fibers based on natural polymers. Methods of modification of viscose fibers. Obtaining fibers with new properties: non-combustible, ion exchangeable, and other biologically active. Directions for further research and development of technology.

The primary structure of natural polymers (chitin and its derivatives, sodium alginate, etc.). Supermolecular structure of natural polymers. Possible applications for the production of polymers of natural fiber materials. Technological scheme of spinning process based on natural polymers. Properties and application of the fibers and yarns based on natural polymers.

Section 7. Chemisorption fibrous materials

The notion chemisorbtsinnyh fibers, their classification. Chemical and technological patterns obtaining materials based on the chemisorption of polyolefin, polyester, polyamide, polyacrylonitrile, rayon, and others. Fibers and their properties, field of application.

Section 8. Carbon fibers

A brief historical overview of the production of carbon fibers. Structural and mechanical characteristics of carbon fibers.

Obtaining of carbon fibers Preparation based on cellulose hydrate precursors. Requirements for cellulose hydrate precursors. The main regularities of structure formation in the preparation of carbon fibers. Effect of heat treatment conditions on the properties of carbon fibers. Hardware design of heat treatment processes of cellulose hydrate fibers.

Getting sorption-active carbon fibers. Properties and based carbon fiber based on cellulose hydrate precursors.

Obtaining of carbon fibers based on polyacrylonitrile precursor. Requirements for polyacrylonitrile precursor. Laws of the pyrolysis of polymers and copolymers of acrylonitrile. Heat treatment of oxidized PAN fibers. Hardware design of heat treatment processes PAN fibers. Properties and applications of carbon fibers of PAN based fibers.

Preparation of carbon fibers from pitches. Preparation and properties of fiber-forming pitches. Forming and heat treatment "Pitch" fibers. Properties and applications of carbon fibers based on pitches.

Section 9. The fibrous nanomaterials

A brief historical sketch of the development of the research in the field of fibrous nanomaterials. Physico-chemical and technological features of obtaining fibrous nanomaterials based on various fiber-forming polymers. Hardware equipment. Properties and applications of fibrous nanomaterials.

Getting carbon nanomaterials. Chemical and technological patterns of production of carbon nanomaterials. Process equipment. Properties and applications of carbon nanomaterials.

Section 10. Fibrous medical supplies

Requirements for bioactive fibers and yarns. Types of dietary fiber materials, methods for their preparation, properties and applications. Requirements for surgical retention suture. Types of surgical sutures, methods for their preparation, properties and application features.

Practical classes

1. Calculation of the composition, the exchange capacity of chemisorption fibrous materials.
2. Calculation of the modifiers to obtain fibers of special purposes.
3. Calculation of fibrous materials for special applications.
4. Process calculations in the production of carbon fibers.

The list of tests

1. Fibrous materials for special purposes based on polyesters, polyamides, polyolefins.
2. Chemisorption fibrous materials.
3. Carbon fiber materials.
4. Fibrous materials for medical purposes.
5. The fibrous materials based on natural polymers.

7.2. MODERN ASPECTS OF THE PRODUCTION OF FIBERS AND YARNS TEXTILE INDUSTRY

The aim of the course - the expansion and updating of theoretical and practical knowledge of workers in the chemical industry for the production of textile fibers and yarns to improve the efficiency of their professional activities.

Training courses introduce to the main directions of the development of manufacture of textile fibers and yarns at the present stage, physico-chemical and technological patterns of their molding and trim (drawing, heat treatment, dyeing, etc.), As well as ways to modify their properties.

Objectives

A study of the program, students

must have an idea:

— the current state and prospects of the development of manufacture of fibers and yarns of textile industry in the Republic of Belarus and the world;

— the achievements of science and technology in manufacture of fibers and yarns for textile applications;

— about the basic methods of preparation, fibers and yarns textile industry, their advantages and disadvantages, areas of use.

must to know:

— basic requirements for the fiber-forming polymers for processing into fibers and yarns textile industry, methods of analysis of the main technological characteristics;

— basic physico-chemical and technological regularities of processing of fiber-forming polymers in fibers and yarns textile industry,

— methods of physical, physico-chemical and chemical modification of the properties of fibers and yarns of textile applications;

— basic requirements for finished products;

— methods of analysis of the main technological characteristics.

The content of the program

Section 1. Introduction

Types of textile fibers and filaments of textile application. Requirements for textile yarns, methods for their preparation. The application of synthetic and artificial filament yarn in the textile sector.

Section 1. Requirements for fiber-forming polymers for a melt molding method of synthetic fiber materials

The structure and properties of the fiber-forming polymers capable to be processed with the "melt" method. Linear structure. The regularity of the structure. The flexibility of the macromolecules. Molecular weight. Polydispersity. Methods for evaluating the molecular-

weight characteristics. The shape of macromolecules. Physical states. Thermal and rheological characteristics. Ability to fiberization (spinnability of the melts).

Section 2. Obtaining of fiber polyesters and polyamides

A brief historical sketch of the development of research in the field of polyester and polyamide textile yarns. Raw materials for the production of "melt" synthetic fibers Synthesis and properties diglikoltereftalata (DKT) - monomer in PET manufacture. Basic laws of the process of obtaining PE polycondensation DHT. Technological schemes for the synthesis of PET. Synthesis of fiber forming polyamide (PA6 and PA66). The main technological regularities of polyamidation caprolactam and AH salt. Technological schemes of PA6 and PA66 synthesis.

Section 3. Obtaining of fiber polyolefins

Basic laws of synthesis of fiber-polypropylene (PP) stereoregular structure of isotactic structure, reaction mechanism. Technological schemes of obtaining, parameters, hardware design principles. Requirements for the manufacture of PP fibers and yarns of textile industry.

Basic laws of synthesis of fiber-forming linear polyethylene (PE) (HDPE), the reaction mechanism. Requirements for the manufacture of HDPE fibers and yarns.

Section 2. The properties of polyethylene, designed for the processing of fibrous materials for textile application.

Reasons for preferential use of polyethylene terephthalate (PET, PET) as a polyester spinning. Structure, properties, quality indicators PET intended for processing into textile fibers and yarns. Features of the requirements for the preparation of PET fibers and yarns with linear low density single filament, profiled, and bi-component hollow fibers in high-speed molding technology (WSF). Properties of the PET copolymers (co-PET), and their applications.

Section 4. The properties of polyamides for processing fibrous materials in textile industry

Causes of primary use polycaproamide (PKA, PA6, polyamide-6) and polyhexamethylene adipamide (PGMAA, PA66, polyamide-6,6) in the production of fibers and yarns textile industry. Basic requirements for PA6 and PA66, recycled into technical and cord threads. Structure, properties, quality indicators PA6 and PA66 of technical purposes. Examples of the use of the copolymers (co-PA).

Section 5. Preparation of the granulate polymers for extrusion by melting

Drying technology of the granulate ensures the preservation of properties and minimum residual moisture. Effect of "surface", "capillary" and "bound" ("hydration") on the dynamics of water drying process. Design features of the dryers so as to avoid agglomeration (clumping, slagging) granules, dust accumulation in the granulate and ensuring uniformity of the physical structure of granular polymers. The need to combine the drying and crystallization of polymers. Technological conditions of crystallization processes. Features of hardware design, technological schemes of preparation for forming granules of increased dispersion. Technological schemes of preparation of drying air and nitrogen recirculation loop.

Section 6. Technological scheme of manufacture of complex polyester and nylon yarns of textile industry

Range, field of application. The classification of options for shaping. Technological schemes of obtaining smooth and textured yarns, hardware design. Structural changes in the polymer substrate in the process of yarn texturing. The essence of the ways to achieve the effect of texturing with "finches" friction, roller or cylindrical types of mechanisms, crimping, aerodynamically (pneumo-texturing). The essence of the combined processes of drawing and texturing of POY-filaments. Technological features of obtaining of textured yarns of curtains range. Obtaining pneumo-textured threads on POY-technology (method «Draw Heat Set»). Obtaining low-, medium- and highly elastomeric textured yarns. Design and technological solutions to ensure a smooth and textured multi-micro- and multifilament yarn, their development prospects, markets, applications. Technological features of obtaining of roving, bulky yarns of carpet range () differently shrinkable, naps, shaped, buttonhole, combined, melanged and others. The advantages and feasibility of single-process methods. Obtaining of ROY, FOY, NOY, LEY and other threads. Modern technological production schemes MCS through POY and FOY yarn (respectively, two and single-process schemes). Technological schemes of obtaining bleached and dyed (single and multi-color) textile yarn dyeing using "en masse" using "master batch" and "surface" method. Labor protection, material and energy costs in the production of textile yarns application.

Section 7. Technological scheme of manufacture of polyester, polyamide and polyolefin fibers (uncrimped and crimped loose rope\ yarn, staple fibers)

The range of specific properties, applications (textile and technical direction). The two-step process (molding line plus finishing line) manufacture of staple fibers. Technology for producing a staple fiber in the form of single-stage continuous process lines forming, finishing, stretching, crimping, fixing, cutting, and packaging. The use of booster pumps in the lines of compression molding directly from the melt. The concept of transport of "cans" (containers with freshly-spun loose pope\ yarn) on the rails or with the help of "lifting by a robot to creel prepared for automatic filling. Using the spin pack rectangular, annular and circular forms. The essence of the method N3S2S. Process flow scheme of the staple units (SHA). Avivage and antistatic finishing system. The main components that make up the avivage finishing baths. Regulatory principles of crimping (wave) with evacuation. Technological features of manufacture of fibers of cotton, linen, wool, carpet, geotextile types ("harsh" and painted "en masse"). Technological features of obtaining highly-shrinkage (HS), uncrimped, highly crimped (flat and volumetric, with two- and three-dimensional crimp), "short" ("Knop", "flock", "fibrin"), "ball", flat, anti-bacterial, and shaped hollow fibers (type "trilobal"), microfibers, fibers with slippery and hard stamp (e.g., receiving fiber filler "fiber-fil" "microfiber" type "swan fluff" siliconized etc.) with permanent antistatic effect, with a low pilling, surge, with high dyeability, with reduced flammability, low-melting, SD, AR, HT, HT / HM, SHT and other types of fibers. Labour protection, material and energy costs in manufacture of BCF and staple fibers.

Extrusion Line (CVL, BNR, FB7, LFN et al.) For manufacture of "severe" and painted "en masse" of film yarns (ribbons, strips, "rafy"), flagella and fibrillated yarns in application.

Section 8. Technological schemes of obtaining bicomponents synthetic fibers

Raw materials for the manufacture of bi-component fibers (BKV) and threads (BKN), their properties, applications, classification, classification, development prospects. Principles of hardware design processes of bi-component fibers and yarns. Obtaining bicomponent fiber

with spinning and mixtures of half-hard and flexy-chain polymers. Textile effects achieved when using fibers produced from the polymer mixture of the same chemical nature, but with different molecular weight. Technological peculiarities of obtaining of bicomponent fibers used as "fillers", optical or "glue" fibers. Technological peculiarities to obtain bicomponent fibers and filaments morphology structures "side-by-side» (S / SR, S / S-1, S \ SF), «core-shell" (C / C, C / O), etc.. The principal features of molding(spinning) and MOY POY bicomponent filaments from incompatible polymers with the sectoral structure of the cross section of yarn ("orange slices", "pieces of cake", "Islands in the sea"); the essence of thermal methods of compacting of data filaments (PPY receiving threads).

Section 9. Methods of physical, chemical and physico-chemical modification of synthetic fibers

Methods for modifying ofsynthetic fibers and filaments are structural (physical) realized without changing the primary structure of the spinning polymer macromolecules; physicochemical conducted with changing compositional polymer melts; chemical, implemented as a change in the primary structure of the macromolecules (with copolymerization or copolycondensation) and changing the composition of the surface layers of the fiber with similar reactions and polymer-grafting reactions. Regulation of the cross-sectional shape, and surface texture relief fibers (morphological modification), the linear density, filament, physico-mechanical properties of fibers and filaments. Structural changes in the spinning polymer melts when filling with disperse fillers and pigments. Influence of additives on highly physical and mechanical properties of the fibers and yarns. Flow charts of dyeing fibers and filaments in the "weight". Changing of the primary structure of polymers and macromolecules regulation flexibility, heat, and light fastness chemo- fibrous materials. Principles of technology «Shin Goosen».

Technological features of synthesizing the color (or structural-colored) fiber-forming polymers. Modification of synthetic fibers by mixing a general fiber-forming polymers via melt. Compatibility of polymers. Process for obtaining composite yarns principles of ultrafine fibers and a matrix-fibril structure ("M / F») from the mixtures of polymer melts. Methods of chemical modification of fibers: getting chemisorption, malopillinguemyh, low-melting, hydrophilic, antimicrobial, with improved dyeability, given shrinkage, flame, etc.. The possibility of using laser irradiation to modify the polymer structure and properties of fibers.

Section 10. Features of synthesis and properties of small-capacity fiber-forming polymers, technological schemes of obtaining fibrous materials based on them.

Polyester fibers based on polyalkyleneterephthalates (PAT): polimetilentereftalat (PMT); polypropyleneterephthalates (PPT) or polytrimethylene (PTT); polybutylene terephthalate (PBT); poly (butylene terephthalate-co-ethylene terephthalate); polyethylene naphthalate (PEN, PEN). Technological schemes of fiber-PPT and PBT. Properties and applications of the polyester fibers obtained with the above APM.

The chemistry of the fundamental laws, technological schemes, parameters and principles of hardware design processes for light-duty polyamides and polyamide fibers on their basis (PA7 - enanth, PA9 - Pelargonium, PA11 - undecane, PA12 - dodecane).

General ideas about the structure and composition of fiber-polyurethane (PU). The starting materials (polyols, diisocyanates macrodiizotsianaty, polyesters, polyetheresters, et al.) For the synthesis of fiber-CP. Chemical reactions during the synthesis of fiber-CP. Relationship between the structure and properties of PU produced yarns. Methods of

preparation of the spinning PU. Classification of PU yarns, technological schemes of obtaining. PU molding methods threads such as "spandex", "elastan". Technological parameters of molding PU threads with "melt" method. Properties and applications of PU filaments.

General idea of the source of raw materials, methods of synthesis, structure, structure, properties of fiber-acetal (polymethylene - CSI), technological schemes and applications received on the basis of its fibers and yarns.

Section 11: Synthesis and properties of fiber-forming polymers based on acrylonitrile.

Basic physical and chemical laws of free-radical polymerization. Influence of physical and chemical factors on the synthesis of copolymers of acrylonitrile. Synthesis of copolymers of acrylonitrile. Influence of structure on the reactivity of the monomers. Regulation of compositional acrylonitrile copolymers.

The properties of the homopolymer and copolymers of acrylonitrile. The rheological properties of spinning solutions. Requirements for fiber-acrylonitrile copolymer and spinning solution used in the production of acrylic fibers. Analytical control for spinning solution, methods for studying the rheological properties of solutions of polymers based on acrylonitrile, methods for determining molecular weight and molecular weight distribution.

Section 12. The main technological schemes of forming acrylic fibers and yarns for textile applications

Filament formation with "wet" and "dry" method. Physico-chemical and technological rules of the spinning process of polyacrylonitrile fibers and filaments. Influence of conditions filament formation, drawing, heat treatment on the structure and properties of PAN fibers of textile industry.

Section 13. Methods modifying the properties of acrylic fibers

Physical, physico-chemical (inclusive), chemical modification of PAN fibers to regulate their consumer properties. Methods of regulation of the prime structure of the spinning of PAN.

Section 14. Obtaining of viscose

Requirements for cellulose intended for processing into textile fiber materials, molecular weight, polydispersity, cleanliness, ability to dissolve to form a concentrated solution ("reactivity"). Effect of molecular weight and polydispersity characteristics of cellulose on fatigue characteristics of the fibers. Preparation of the alkali cellulose. Alkali cellulose prematuring. Physico-chemical, chemical and technological characteristics of the xanthate process. Dissolution of the xanthate cellulose. "Maturation" of the viscose. Preparation of spinnable viscose. Requirements for viscose intended for processing into fibers and yarns for textile application.

Section 15. Physical and chemical patterns of forming process of viscose fibers

Outflow through the nozzle aperture and the formation of the jet diffusion processes, chemical transformations, deposition of cellulose xanthate and processes of structure, stretching of fibers in the molding process. The one-step method of forming viscose fibers. The composition and effect of the individual components of the coagulation bath onto the

structure of fibers and films. Ways to solve the problem of obtaining monostructured fibers and films. The role of modifiers in the process of structure formation.

The main types of machines for molding. Supply circuit of the spin bath and threading in molding machines.

Process diagrams for dyed yarn and viscose fibers by dyeing in the mass. Requirements for dyes.

Section 16. Finishing and drying of viscose fibers. textile operations

Purpose and physico-chemical laws of individual operations with "wet" and "dry" finishing of viscose fibers, filaments, films: washing, desulfurization, bleaching Kislovke, avivazhnoy processing. Creating of a closed water systems for finishing. Dyeing of viscose fibers in the "gel". Methods and drying characteristics of viscose fibers.

Textile operations in the manufacture of viscose textile and industrial yarns.

Section 17. Obtaining viscose filament yarn

Properties and applications of viscose filament yarn. Getting textile yarns with centrifugal and continuous method. Comparative evaluation of methods, parameters, and hardware design. Methods of obtaining bulk yarns.

Section 18. Obtaining viscose fibers

Properties and the use of viscose fibers. Physical and mechanical properties and structure of the conventional modal and viscose fibers.

Peculiarities of polynosic fibers, BX type, hollow fibers, with a stable crimps and others.

Technology and equipment for the production of conventional viscose fibers "cotton" and "wool" types, as well as loose rope\yarn.

Methods of modification of viscose fibers. Preparation of fibers with new properties: nonflammable, ion exchangeable, and other biologically active viscose fibers. Directions for further research and development of technology.

Section 19. Sewing threads

Types of sewing threads. Requirements for sewing threads. Dependence of physical-mechanical properties of sewing threads corresponding to the characteristics of the polymer. Technological features of manufacture of sewing threads. Technological schemes of forming sewing threads. Properties, application of sewing threads.

Practical lessons

Calculations in accordance with the technological schemes for the production of polyester fibers and yarns textile industry.

Calculations in accordance with the technological schemes for the production of polyamide fibers and yarns textile industry.

Calculations in accordance with the technological schemes for the production of polyolefin fibers.

Calculation of flow spinning solutions, the die, plasticization and "hot" in the production of extracts fibers spun "wet" method. Calculation and selection of the necessary technological equipment for molding.

Calculation of flow of the spin bath in the production of fibers, spun with "wet" method.

Material balances of the solvents with current regeneration schemes in the manufacture in the production of fibers, spun with "wet" method.

The list of tests

1. Manufacture of polyester fiber materials of textile application.
2. Manufacture of polyamide fiber materials of textile application.
3. Manufacture of polyolefin fiber materials of textile application.
4. Manufacture of polyacrylonitrile fiber materials of textile application.
5. Manufacture of viscose fiber materials of textile application.
6. Manufacture of sewing threads.

7.3. THEORETICAL ASPECTS OF MANUFACTURING OF FIBRES, FILAMENT YARNS AND FILMS

The aim of the course - the expansion and updating of knowledge workers in the chemical industry in the field of theoretical aspects of manufacturing of fibres, filaments and films for more effective implementation of professional features.

Training courses introduce to the modern requirements for fiber-forming polymers, modern theoretical laws of processes of spinning liquids, preparing them for molding and processing into fibers, filaments and films in different ways.

Objectives

As a result of the study program the student

must have an idea:

— the current state and prospects of the development of the manufacture of fibers, yarns films in the Republic of Belarus and the world;
— the achievements of science and technology in the manufacture of fibers and yarns;
— about the basic methods for manufacture fibers, filaments and films.

must know:

— physicochemical principles of choice of fiber-forming polymers;
— thermodynamic and kinetic features of the translation fiber-forming polymers into viscous fluid state;
— rheological aspects of transportation and treatment of spinning (molding) solutions and melts and extrusion;
— methods and patterns of filament-formation and orientational drawing;
— physical and chemical laws of fixing structure of polymeric materials.

The content of the program

Section 1. Introduction

Fibrous and film materials and their role in the development of civilization. Classification of chemical fibers. The main stages of the history of man-made fibers and films.

Section 2. The main stage the film- and fiber-forming polymers

Changing into fluid state, filamentary (film-) education, orientation stretching, fixing an anisotropic structure. Formation of minimized by resource and energy consumption processes of synthesis and processing of fiber-forming polymers into fibers, filaments and films. The problem of creating computerized technological schemes; Minimization of environmental pressures by chemical fiber enterprises.

Feature of modern manufacture of chemical fibers and films - versatility, providing a synthesis of fiber-forming polymers, processing them into yarns, fibers and films, the production of fiber composite materials for various purposes: prepregs, premixes etc., Processing into various textile materials.

Section 3. The structure of the fiber and film materials

Levels of structural organization of fibrous materials: primary, secondary. Supermolecular structure "pack" (domains), microfibrils, fibrils. The morphology of the fibers. The porosity, pore distribution of the fibers in size. The impact of flexibility on fiber-forming polymers macromolecules features of the structure of the fibers. Spinning as a sequence of transitions aggregate polymeric substrate: transfer in viscous fluid state; fiber-fiberization while stretching the jet; orientation stretching and fixing of structure. Isotropic (equilibrium) and sinle-pinned (nonequilibrium but stable) structure. Relaxation of stress and strain as the transition from one to another stable state of oriented polymeric substrate. The main technological schemes and kinetic conditioning processes of chemical fibers.

Section 4. Requirements for fibre- and film-forming polymer

Requirements for fibre- and film-forming polymer:

- To the primary structure of polymers. Factors determining the ability of polymers to transition into the viscous-fluid state by melting or dissolving;

- A number average molecular weight and polydispersity and influence on the mechanical properties of the fibers, filaments, films obtained with mono- and multicycle deformations; on the kinetics of the transition from the solid to the viscous-fluid state; the viscosity of melts and concentrated (spinning) solutions and technological schemes of their preparation for fiberization. Requirements for purity and homogeneity of the applied film-polymer and spinning stability of its physico-chemical properties as process transitions. Minimizing the negative effects of the interaction fibre- and film-forming polymer with working surfaces of parts and equipment units.

Section 5. Spinning solution

Thermodynamics and kinetics of linear polymers. Diagrams "structure - property" binodal, spinodal. Additive methods of calculating the solubility parameters of polymers. Kinetics of swelling and dissolution of the polymers. Effect thermodynamic quality of solvent concentration and temperature of the spinning solutions on their effective viscosity.

Technological and instrumental scheme dissolving polymers. Batch and continuous processes. The relationship of the effective viscosity of the spinning solutions with power consumption for mixing.

Rheology of concentrated polymer solutions. Anomaly of viscous properties of solutions fiber-forming polymers: influence of flexibility of macromolecules, the thermodynamic quality of the solvent, the polymer concentration, temperature, velocity gradient and shear stress in the flow.

Section 6. Spinning melts

Thermodynamics and kinetics of melting polymers. Additive methods of calculation of the glass transition temperature, melting and thermal degradation of polymers. Hardware design of fiber-forming polymers melting (extruders, screws, "silver" plate). Reynolds criteria for liquid media. The rheology of polymer melts concentrated. Anomaly of melt viscosity properties of fiber-forming polymers: influence of the flexibility of macromolecules, temperature, shear stress and velocity gradient flow. Temperature-invariant rheogram. Factors determining the efficiency of transportation spinning solutions and polymer melts.

Section 7. Laws of the filtering process of spinning polymer solutions and melts

Types of pollution in the spinning solutions and polymer melts. "Primary" and "secondary" gel particles. The mechanism of their formation, the influence on the stability of the molding process and the physical and mechanical properties of chemical fibers and yarns. Laws of the filtering process (D'Arcy equation): "bung", "intermediate", "Standard" and "slurry" filtering. The main types of filter walls: rigid, flexible, unrelated. Flow charts "periodic" and "continuous" filtration: frame filters, bougie filters, filters with alluvial layer, filter powders melt fiber-forming polymers. Factors determining the filtration rate and purity of the filtered spinning liquids.

Features filtering spinning solutions and melts.

Section 8. Physico-chemical and technological aspects of venting spinning solutions

The solubility of gases in the spinning solutions and polymer melts. Boyle's law. Soluble gas and dispersed in the spinning solution. Factors affecting the rate of venting spinning solutions. Methods and schemes venting process. Methods for hardware-technological decor: periodic and continuous process of venting.

Section 9. Extrusion of spinning liquids

Dosing spinning solutions and melts fibre- and film-forming polymers. Two- and three-gear spinning pumps. The spinnerets used in the various methods fiberization. "Live" section of the die. Formation of the velocity profile of the spinning solutions and melts in a channel die. "Entry" effects. Destructuring spinning solutions and spinning of melts of polymers. Rheology and energy of the extrusion process of spinning solutions and melts. Effects Barrusa and Weissenberg. "Elastic turbulence" - by Vinogradov-Malkin.

The concept of "spinnability" of spinning solutions and polymer melts. Physical and chemical factors that determine the "spinnability" of fiber-forming polymers in viscous fluid state. Scheme "cross - longitudinal velocity gradient" in the process of fiberization. Scheme "drop - jet." Factors determining the stability of jets. Cohesive and capillary-wave destruction of the jet. "Spunbond" hood. Methods of calculation. Reynolds for moving thread.

Section 10. Fiberization upon "melt" method

"Melt" fiberization. The process scheme. Laws of heat transfer. Biot, Fourier Prandtl Nusselt. Methods of blasting of spinning of a thread. The balance of power in the process niteobrazovaniya. Methods for evaluating the security components that determine the yarn tension during fiberization . Influence of process speed fiberization and other technological factors on the processes of heat transfer in the system "thread - Environment" at fiberization niteobrazovanii.

"Spun-off machine" with "melt" fiberization. Fiberization process stability; Stanton criterion. The dynamics of the process of structure formation: orientation, crystallization. Changing into "melt - liquid crystal state - condis-liquid-crystalline state - anisotropic crystal." Ordered phase in the fiber as a system of amorphous molecular structures and the crystallites in the folded elongated chains. Factors determining the crystallization processes "a melt" fiberization: flexibility of macromolecules, the dynamics of heat transfer, the longitudinal velocity gradient (stretching).

Changing the diameter of the formed thread in the process "a melt" fiberization at various speeds of thread reception on the spinning machine. Deborah number and the formation of a "neck" on the molded thread. High-speed molding. Classification of technological options fiberization: LOY, MOY, POY, HOY. Options molding: FOY, FDY. Process Diagrams. Drawing on moldable thread "spinning preparations of" ("oiling"). Communication structure molded threads and thread tension when applying for the package.

High-speed molding. Changing the filament diameter moldable in the process "a melt" fiberization at various speeds reception thread on the spinning machine. Deborah number and the formation of a "neck" on the molded thread. Options of molding: FOY, FDY. Communication structure molded threads and thread tension when applying for the package.

Section 11. Physico-chemical and technological patterns in the production of polymer extrusion films

Scheme extrusion and coextrusion. Types of nozzle heads. Heat transfer processes in the formation of films. Pattern formation, crystallization. Methods of cooling films. Methods of orientation. Methods of winding films. Types of polymer films and their impact on the physical and mechanical properties of the finished products.

Section 12. Fiberization with "dry" method

"Dry" fiberization. Process scheme. Laws of heat transfer. Biot, Fourier Prandtl Nusselt. Features of pattern formation in the process of mass transfer fiberization ("drying" of the jet spinning solution). Criteria Sherwood, Schmidt, mass transfer criteria Fourier Nusselt. The factors determining the rate of solvent removal from the fiber forming. Calculation methods and blasting. The "soft" and "hard" conditions fiberization "dry" method. "Spunbond" extractor and the formation of oriented structures in the thread. Features of pattern formation in the "dry" method fiberization. Methods for applying lubricant to the thread and yarn techniques reception at the "dry" fiberization. Ways of strengthening filaments produced by "dry" method.

Section 13. "wet" method fiberization

"Wet" fiberization. Process scheme. Fiberization options: small and deep forming in the tubes and funnels. Flow and countercurrent flow of the spin bath. Phase equilibria in the spinning solution with the introduction of precipitators: Binodal and spinodal decomposition system "polymer - solvent - precipitant" and the factors that determine their dynamics.

Numbers deposition. Regularities in the process of mass transfer fiberization. Criteria by Sherwood, Schmidt, mass transfer criteria Fourier Nusselt. Factors determining the rate of mass transfer at fiberization "wet" method. "Hard," "mild," "hydrate" spin bath.

Circulation precipitation baths. Balance system component. Calculations. Laws of heat transfer at fiberization "wet" method. Biot, Fourier Prandtl Nusselt. "Spunbond" hood. Features of structure yarns with "wet" method. Technological factors that determine the morphology of the spun yarn. "Gel" fibers. Structure, physical and chemical factors that determine the porosity of "gel fibers."

The balance of power in the process of fiberization with "wet" method. Methods of regulating the thread tension during fiberization. Structural and mechanical properties freshforming\spinning "wet" method of threads. Methods of technological design process "wet" fiberization. Manufacture of textile, industrial yarns and staple fibers.

Section 14. Fiberization for "dry-wet" method

Flow charts "dry-wet" fiberization. Physico-chemical aspects of spinning fibers and "dry-wet" method from polymer dispersions. Technological principles of "electrospinning". Flow charts of these processes. Forming fibers from polymer dispersions.

Section 15. Orientational drawing

The main options of orientational drawing: laminating and "hot" (thermal). Orientation-translation system in a nonequilibrium state. Methods for evaluating the degree of orientation of the macromolecules of the polymer substrate. The anisotropy of properties of oriented fibers. "Mechanical vitrification" of polymer and "natural" hood. Thermodynamic and kinetic aspects of orientational drawing. Lundell-Williams Ferry equation. The flexibility of macromolecules and thread tension. Relaxation phenomena in the process of orientational drawing. Methods of fixation speeds threads on transporting parts (biscuits, rolls). Euler equation.

Laminating stretch. "Athens" structural deformation of the mesh. Influence of methods of plasticizing the polymer substrate on the effectiveness of the orientation process. Methods of technological design of "laminating" stretching. "Hot" stretch. Features of heat transfer with the "hot" pulling the strings. Ways to implement the heating filament: a bath, a camera, "iron". Development of longitudinal velocity gradients of deformation (strain) and the change in the internal stress in tension. " silver cracks " and their relaxation character. Influence of temperature and speed of orientational drawing on the effectiveness of the implementation of the orientation process. Structural changes in the orientational drawing. Criterion by Bailey and Deborah Chart Mueller diagram. Changing the structural and mechanical properties of the yarns and fibers due to orientational drawing: strength, elongation, fatigue characteristics.

Section 16. The washing and finishing fibrous materials

Washing and finishing fibers and yarns spun by "wet" method. Dynamics of mass transfer processes. Biot, Fourier. Influence of structure "gel-fiber" and the intensity of diffusion processes on wash completeness. Continuous and periodic scheme; ways to intensify the processes of washing and finishing of yarns and fibers. Inclusive processes during washing and finishing of yarns and fibers, the possibility of their use for modifying the properties of spun fibers.

Section 17. Drying fibrous materials

Drying the fibers and filaments. Basic definitions. Role of structural organization of the fibrous material in the drying process. Classification of fibrous materials as the drying object. Heat and mass transfer processes during drying. Biot, Fourier, Schmidt Nusselt Lykov critetia, the number Rebinder. Convective and contact, batch and continuous flow diagrams drying yarns and fibers. The development of internal stresses in the drying process. Shrinkage. Air fibers and filaments.

Section 18. Heat treatment of fibrous materials

Fusing and thermo chemical fibers and yarns. Physical and chemical factors that determine the rate of relaxation processes. Effect of temperature, environment and the applied external force field on the dynamics of restructuring the fiber. Shrinkage of fibers and yarns. Equation Ribnik and Geller. Aggregation and phase changings at Thermorelaxation and termofixation treatments. Changing the mechanical and structural-morphological properties of fibers and yarns for fixing step. Methods for assessing the effectiveness of thermo and fusing fibers and yarns.

Section 19. Texturing fibrous materials

Physical and chemical laws texturing process of chemical fibers and yarns. Methods of imparting stable fiber crimp of filaments and texturing methods based on fiber-forming thermoplastic polymers. Changing the structural and mechanical properties of fibers and filaments by texturing.

Practical lessons

The rheological properties of the spinning solutions and spinning of melts of polymers. Pressure drops during transportation. The geometrical dimensions of technological pipelines.

The rheological properties of the spinning solutions and spinning of melts of polymers. Filtering. Venting spinning solutions.

"Spinnable" spinning solutions and melts of fiber-forming polymers. "Spunbond" drifting. Calculation of flow spinning solutions and melts to "working" spaces.

Regularities of the processes "a melt", "dry" and "wet", "dry-wet" method of fiberization. The stabilization process of fiberization. Calculations.

Laws of orientational drawing and shrinkage fibers. Calculations. Washing and drying of fiber strands. Fusing processes and thermo chemical fibers and yarns.

The list of tests

1. Preparation of spinning liquids, their preparation for molding.
2. Basic methods fiberization of chemical fibers and yarns.
3. Finish chemical fibers and yarns.
4. Preparation of film materials.

7.4. MODERN ASPECTS OF THE PRODUCTION OF YARNS AND FABRICS FOR INDUSTRIAL PURPOSES

The objective of the course - the expansion and updating of theoretical and practical knowledge of the staff in the chemical industry in the production of yarns and fabrics for industrial purposes to improve the efficiency of their professional activities.

Training courses are introduced to the main directions of development of production of fibers for industrial purposes at the present stage, physico-chemical and technological patterns of their molding, trim (drawing, heat treatment, etc.), As well as their processing in the tissue.

Tasks

As a result of the study program the student

must have an idea:

— the current state and prospects of development of production of fibers and fabrics for industrial purposes in the Republic of Belarus and the world;

— the achievements of science and technology in the production of yarns and fabrics for industrial purposes;

— about the basic methods for producing yarns and fabrics for industrial purposes, their strengths and weaknesses, applications.

must know:

— basic requirements for the fiber-forming polymers for recycling in industrial yarn, methods of analysis of the main technological characteristics;

— basic physico-chemical and technological regularities of processing of fiber-forming polymers in industrial yarn,

— basic physico-mechanical and technological regularities of processing threads in the fabric for industrial purposes,

— basic requirements for finished products;

— methods of analysis of the main technological characteristics of the finished product.

The content of the program

Section 1. Introduction

Types of technical yarns. Requirements for technical yarns. The application of synthetic and artificial filament yarn in the technical sector.

Section 2. Preparation of fiber polyesters and polyamides

A brief historical sketch of the development of research in the field of polyester and polyamide technical fibers. Raw materials for the manufacture of "melt" synthetic fibers Synthesis and properties diglykoltereftalat (DGT). Basic laws of the process of obtaining PE polycondensation DGT. Technological schemes for the synthesis of PET. Synthesis of polyamide fiber (PA6 and PA66). The main technological regularities of polyamidation caprolactam and nylon salt. Flow charts PA6 and PA66 synthesis.

Section 3. Properties of PET intended for processing technical yarns

Reasons for preferential use of polyethylene terephthalate (PET) as the polyester spinning. Features of the requirements for the preparation of high-strength PET (HT), high modulus (HM), and others. Technical yarns. Structure, properties, quality indicators PET intended for spinning technical purposes.

Section 4. The properties of polyamides for processing in technical yarns

Causes of primary use polycaproamide (PKA, PA6, polyamide-6) and polyhexamethylene adipamide (PGMAA, PA66, polyamide-6,6) in the manufacture of yarns for industrial purposes. Basic requirements, requirements for PA6 and PA66, recycled in technical and cords. Structure, properties, quality indicators PA6 and PA66 technical purposes. Examples of the use of the copolymers (co-PA).

Section 5. Complex polyester and polyamide technical yarns

Requirements for technical yarns. Dependence of physical-mechanical properties of the filaments of the molecular weight characteristics of the polymer. Comparative evaluation of consumption of polyamide and polyester industrial yarn. Technological features of processing high molecular weight polymers in technical and cords. The range of options for shaping. Technological features of obtaining high (HT), high modulus (HM), little shrinkaged (LS), HMLS, NMNT cords. The role of technological operations twist, doubled and cabling in the production of technical yarns used construction torsional and doubling-twisting machines, machine systems cabling. Methods of increasing heat and light fastness and technical cords. Methods of improving the technical and adhesion of cords to the rubber.

Section 6. Preparation of polyolefin fibrous materials

Basic laws of synthesis of fiber-polypropylene (PP) stereoregular structure of isotactic structure, reaction mechanism. Technological schemes of parameters, hardware design principles.

Basic laws of synthesis of fiber-forming linear polyethylene (PE) (HDPE), the reaction mechanism.

Requirements for polyolefins intended to be processed into fibers and yarns for industrial purposes. Technological features for producing polyolefin yarns for industrial purposes.

Section 7 Manufacture of viscose

Requirements for cellulose intended for processing into technical fiber materials, molecular weight, polydispersity, cleanliness, ability to dissolve to form a concentrated solution ("reactivity"). Effect of molecular weight and polydispersity characteristics pulp strength and fatigue characteristics of the fiber materials. Preparation of the alkali cellulose. Prematuring of alkali cellulose. Physical, chemical and technological characteristics of the process xanthation. Dissolution of the cellulose xanthate. "Maturation" viscose. Preparation spinnable viscose. Requirements for viscose intended for processing into fibers and yarns for industrial purposes.

Section 8. Viscose fiber materials for industrial purposes

The structure and the technical properties of viscose fibers. Requirements for viscose intended for processing into technical yarns. Physical, chemical and technological patterns of the process of obtaining technical threads, process equipment molding and trim. The space

occupied by the viscose technical threads among other types of technical yarns, their advantages and disadvantages, applications.

Properties and the use of viscose fibers for industrial purposes. Physical and mechanical properties and structure of modal viscose fibers. Types of modal fibers. Features Technology Receiving viscose high modulus fibers in the wet state.

Section 9. Filaments based on fluoropolymers

A brief historical sketch of the development of research in the field of yarns based on fluorin polymers. Methods for obtaining the monomers and their properties. Synthesis of fiber-forming polymers and copolymers, their physical and physicochemical properties. Methods for forming fibers and filaments fluorinated. Properties, application of fluorine-containing fiber materials.

Section 10. The aramid yarns

A brief historical sketch of the development of research in the field of aramid fibers. Classification of aramid fibers. Monomers used for the synthesis of fiber-forming polymers. Synthesis of aromatic polyamides and the spinning properties. Properties of spinning solutions. Properties of the fibers forming iso- and anisotropic solutions. Heat treatment of aramid fibers. The structure, properties, use of aramid fibers.

Section 11. Ultra-high module yarns based on heterocyclic lyotropic polymers

A brief historical sketch of the development of research in the field of heterocyclic lyotropic polymers.

Types of heterocyclic lyotropic polymers. Synthesis of fiber-forming polymers, forming, heat strengthening fibers based on poly-n-fenilenbenz bis-thiazole, poly-p-fenilenbenz bis-oxazole et al., Their properties and applications.

Section 12. Technical yarn based on thermotropic polymers

A brief historical sketch of the development of research in the field of fibrous materials based on thermotropic polymers.

Synthesis of fiber-forming polymers, molding, hardening of the fibers based on thermotropic polymers. The structure, properties and applications based fibers thermotropic polymers. Labour protection issues in the production of high-strength high modulus synthetic fibers.

Section 13. Carbon fiber

A brief historical overview of the production of carbon fibers. Structural and mechanical characteristics of carbon fibers.

Obtaining of carbon fibers based on rayon precursors. Requirements for rayon precursors. The main regularities of structure formation in the preparation of carbon fibers. Effect of heat treatment conditions on the properties of carbon fibers. Hardware design of heat treatment processes rayon fibers. Getting sorption-active carbon fibers. Properties and based carbon fiber rayon precursors.

Obtaining of carbon fibers based on polyacrylonitrile precursor. Requirements for polyacrylonitrile precursor. Laws of the pyrolysis of polymers and copolymers of acrylonitrile. Heat treatment of oxidized PAN fibers. Hardware design of heat treatment processes PAN fibers. Properties and applications of carbon fibers of PAN based fibers.

Preparation of carbon fibers pitches. Preparation and properties of fiber-pitches. Forming and heat treatment "Pitch" fibers. Properties and applications of carbon fibers based pitches.

Section 14. Inorganic fibrous materials

A brief historical sketch of the development of research in the field of inorganic fibrous materials. Boron and other high-strength high modulus fiber materials. Flow diagrams for borovolframovyh, borouglerodnyh, carbide, etc.. Fibers. The structure, properties and applications of these fibrous materials.

Types of glass, their composition. The methods of obtaining the basic laws of glass. Range, properties and application of glass fibers.

Silica, basalt fiber materials: composition, methods of preparation, properties and application.

Section 15. Manufacture of technical fabrics

The concept of the structure of the tissue. The range of technical fabrics. Types of weaving weaves in the production of technical fabrics. SUMMARY forming fabric on the loom. Requirements for the warp and weft yarns in the production of technical fabrics for various purposes: cord, filter, for conveyor belts, geogrids and others. Preparation of warp and weft threads for weaving.

Process flow diagram of the loom. Classification looms intended for the manufacture of technical fabrics. Technological schemes of cord fabrics of various structures.

Flow charts adhesive cord fabric impregnation.

Practical lessons

1. The calculations in accordance with the technological schemes for the production of polyester industrial yarns.

2. The calculations in accordance with the technological schemes for the production of polyamide technical fibers.

3. Calculation of flow spinning solutions, the die, plasticization and 'hot' hoods in the production of technical yarns, spun "wet" method. Calculation and selection of the necessary technological equipment for molding industrial yarns "wet" method.

4. Calculation of filing of the coagulation bath in the production of technical yarns, spun "wet" method.

5. Material balances solvents with current regeneration schemes in the manufacture in the production of technical yarns "wet" method.

6. Process calculations in the production of fibrous materials based on fluorinated polymers.

7. Process calculations in the manufacture of aramid fibers.

The list of tests

1. Technical polyester yarns.
2. Technical polyamide yarns.
3. Technical polyolefin yarns.
4. Viscose fiber materials for industrial purposes.
5. High strength, high modulus filaments of aromatic polyamides based, heterocyclic lyotropic, fluorine, thermotropic polymers.
6. Inorganic fibrous materials for industrial purposes.
7. Production of fabrics for industrial purposes.

7.5. ENGLISH LANGUAGE. PROFESSIONAL VOCABULARY IN CHEMICAL TERMINOLOGY

The objective of the course - expanding and updating the skills of reading and foreign language communicative (language, speech, compensatory, educational and cognitive) competencies of Chemical Staff in the production of chemical fibers, as well as the development of previously acquired social skills in situations of socio-political, consumer and business communication.

Tasks

As a result of studying the listener must have receptive and productive skills:

Receptive skills:

listening

—have audio perception of foreign language speech in natural pace (authentic monologue and dialogue professionally oriented texts with a different understanding of the completeness and accuracy of their content;

—reproduce heard by repeating, rephrasing, retelling.

reading

—own all kinds of reading (for detail, skim, scanning, specific info), suggesting different degrees of reading comprehension;

—fully and accurately comprehend the content of professionally oriented, using a bilingual dictionary (reading for detail);

—understand the overall content of the text (70%), determine not only the range of issues involved, but also how they are resolved (skim reading).

—get an overview of the topic, the circle of issues dealt with in the text (scanning reading);

—find specific information (definition rule, digital and other data), which is known in advance that it is contained in the text (for specific information).

Productive skills:

speaking

monologue speech

- produce a detailed prepared and unprepared statements on professional communication listed in this program;
- summarize the information received;
- convincingly present their views on the described facts and events, to draw conclusions.

dialogue speech

- come into contact with someone, maintain and terminate the conversation, using appropriate verbal formulas and rules of speech etiquette;
- share professional and non-professional information with someone, expressing agreement / disagreement, doubt, surprise, request, suggestion, proposal, etc .;
- participate in the discussion on the topic / issue, defend their point of view;
- combine dialogic and monologic forms of speech.
- letter
- perform written assignments to listen to what they see, read, logically and convincingly express their thoughts, observing stylistic and genre features.

The content of the discipline

Topic 1. Fibers classification. Synthetic fiber: polyacrylonitrile, polyvinyl chloride, polyvinyl alcohol, polyethylene, polypropylene, polyester, polyamide, glass and others. Properties and Applications.

Topic 2. The main raw material used in manufacture of chemical fibers (monomers, polymers, copolymers).

Topic 3. Basic chemical processes for the synthesis of fiber-and film-forming polymers.

Topic 4. Basic chemical processes in the manufacture of fiber and film materials.

Topic5. Basic chemical processes in dyeing and finishing of textile materials.

Topic 6. The equipment, technologies and materials of chemical production. Information search. (Foreign language database. Internet resources).

Topic 7. Hardware design various stages of the process.

Topic 8. Recommendations to improve the quality indicators of the chemical industry in terms of the effectiveness of performance, cost, etc. (Speech at a production meeting. Business game.)

Topic 9. Information Retrieval (foreign language database, online resources). Independent information retrieval and public speaking students with individual scientific and practical reports on the business game-competition "International Conference on topical issues studied the industry."

For monitoring students' knowledge on the topics provided tests 1 - 7.

8. E-LEARNING COURSES PLANNED TO DEVELOPE IN BELARUSIAN STATE ECONOMIC UNIVERSITY

8.1. ORGANIZATION AND REGULATION OF LABOR

The objectives of training courses facing labor economist and quantity surveyor companies - the development of science students of the provisions on labor, its components and trends, the acquisition of skills and practical skills in analyzing and assessing the level of regulation and pay in the workplace, in the workplace and to develop recommendations to improve them. The study of research methods of work and the establishment of labor standards in the various labor processes. Mastering the technique to develop standards for labor, their design and implementation in production. Upgrading of existing labor standards, maintaining their strength and determination of the effectiveness of replacement and revision of labor standards. Stimulate the progressive rates. Familiarization with modern flexible wage system.

As a result of studying the discipline, students:

must know:

— basic theory of science of labor standards, elements and their characteristics;
— the methodology of research work processes and working time;
— the methodology of designing work processes and the development of regulatory balance of working time;
— valuation methodology for analyzing the workplace and in the enterprise;
— methodology and methods of establishing labor standards in the various labor processes;
— methodology for developing labor standards;
— method of replacement and revision of labor standards;
— flexible wage system.

must be able to:

— conduct pictures time and timing;
— analyze working time and reveal his loss;
— analyze and design the work process;
— determine the cost-effectiveness of updating labor standards;
— expect labor standards and to determine the level of their performance;
— implement flexible wage system.
— evaluate the level of valuation work in the enterprise;
— observe the using of working time;
— identify shortcomings in the organization of workplaces;
— establish different standards for labor processes;
— use of standard materials;
— determine the quality of labor standards.

The content of the program

Topic 1. Scientific basis for the organization of workplaces.

On the rationalization of work processes

Topic 2. **The efficiency and effectiveness of work.**

Performance and its phase. Planning of working time taking into account the phase performance. Modes of work and rest.

Topic 3. **Innovative methods of work.**

Scientific methods of work. MICROELEMENT regulation of labor.

Topic 4. Methods of studying labor processes.

Working time as an economic category and its functions. Working time as a legal category. Calender volumetric measurement and working time.

Classification of working time, its purpose and types. Characteristics of the individual working time and indexation (readjustment). Methods of study of working time, their variety and characteristic features.

Photo working time (DAF), objectives and types: employee, equipment and production process. DAF artist: individual - the technique of its implementation, data processing and analysis. Calculation of working time and labor productivity growth. The essence of the group, brigade and routing photos of work, methods of their implementation, data processing and analysis. Photos of working day: workers, managers and specialists, their characteristics, objectives and methodology of.

Method of moment observations (MCM), the nature, characteristics, scope. The methodology of the MCM, processing and analysis of data. Timing, its essence, purpose and scope. Types of timing and methods of observation, data processing and analysis chronometer observations. Photostandards, its nature, scope, method of implementation, monitoring and data processing.

Topic 5. Establishment of labor standards in the various labor processes.

The essence of optimization of labor standards.

The technique of establishing labor standards in the various labor processes.

Concepts technically sound and scientifically credible labor standards, their origin, harmonization and use in the practice of enterprises. Classification of labor standards on methods of establishing, content, degree of integration, the validity period, the field of application and commitment.

Time rate as a basis for calculating other labor standards. The composition of standard time and method of its determination. The influence of the nature of work and the type of organization of production on the definition of the norm method time.

Production rate per hour, per shift and method of identifying. Interconnection standards time and performance standards. Pricing and method of its determination.

Features valuation of work in various types of production. The use of labor standards in operational and strategic planning and forecasting. Social-economic importance of progressive labor standards.

Technique to establish rules and normalized assignments.

Topic 6. Using EMM and computer programs to develop standards for labor.

Labor standards and their types. The main stages of work on the development of normative materials. The use of economic and mathematical methods and computer technology in the development of standards. Preparation of draft standards, their testing and approval.

Topic 7. The tension of labor standards and their update.

The concept and the level of tension norms. Their compliance with least labor and the task of maintaining their progressiveness. The procedure for the revision of standards in the enterprise - milestones and their contents. Factors and timetable for updating labor standards. Analysis of the quality standards and targets for labor. Productivity growth and reduce the labor intensity of production as a basis for the development of projects for the revision and replacement rules. The order of selection rules for the upgrade. Determination of the expected percentage of their performance after the replacement and implementation. Economic efficiency upgrade labor standards. The introduction of labor standards and the promotion of work on them.

Book-keeping for performance of labor standards - individual and staff groups- according to the norms of time, the development and wages, in shifts and hours actually worked. Analysis of state regulation of labor in the company and its effectiveness.

Topic 8. Monitoring of labor standards.

Quality indicators of labor standards. Analysis of the organization and regulation of labor in the enterprise.

Topic 9. The system of social guarantees to workers: social benefits and pensions, SASH.

Social insurance and pensions. Social services and state targeted social assistance.

Topic 10 Problems of labor standards: the exchange of experience.

Final tests

1. The essence of valuation work, its functions and principles.
2. The object, subject and tasks of work standards.
3. Methods of valuation work.
4. Stages of development of the science of the regulation of labor.
5. Working time: the concept, its structure and accounting.
6. Tasks of the working time.
7. Classification of working time.

8. The concept of industrial, technological and labor process.

9. The content of the labor process and its kinds.

10. The structure of the manufacture operation.

11. The need, the basic methods and steps to examine the costs of working time.

12. Photo of working time.

13. Timing as a method of studying the working time.

14. The method of moment observations.

15. Types of labor standards and their characteristics.

16. Method for determining labor standards.

17. Contents of work on standardization of work.

18. Order a valuation by an analytical method.

19. Classification of analytical methods for the valuation of labor.

20. Summary and trace element methods of work.

21. Features of rationing of work in different types of industries.

22. The essence of the analysis of work processes.

23. Areas of analysis and work processes rationalization.

24. The principles of rationalization of work processes.

25. Appointment of labor standards.

26. Classification of labor standards.

27. Requirements for the organization of work in the development of standards and stages of development.

28. Types of systems of organization of standardization.

29. Service of labour standardization a in the enterprise.

30. Directions for labor standards.

31. Indicators of labor standards.

32. Replacement and revision of standards in the enterprise.

33. Quality control standards.

34. The establishment of standards at hand, machine-hand and machine work.

35. Rationing of labor in automated production.

36. Rationing of labor in instrumental processes.

37. Method of valuation of labor support workers.

38. Rationing of labour major categories of auxiliary workers.

39. Normalization of administrative work.

40. The Office of the valuation of work in the country.

41. The analysis of payroll.

42. Planning payroll budget.

43. Forms and wage systems.

44. The flexible wage systems.

45. The tariff system of remuneration.

46. The commission wage system.

47. The system of remuneration based on the floating salary.

48. The grade system, its features.

49. Foreign experience wage.

50. Conditions of use of new systems of remuneration.

8.2. HUMAN RESOURCE MANAGEMENT

The objective- to identify the main problems in the personnel policy of the organization and to show ways to address them.

During the training, students should examine the role of HR to ensure the selection of experts, and other categories of workers with the needs of the organization, office work in Human Resources.

Explore the legal regulation of labor relations, health and safety and responsibility of employees, work organization staff. Learn technique study and management decision-making in the field of personnel management, health workforce policy organization.

At the end of training courses, students:

must know:

— methods of formation and composition of the personnel policy of the organization;
— methods and timing of certification of personnel;
— requirements and procedure for record keeping, content and order of an employment contract;
— requirements for staff to ensure labor discipline, calling to an account:

must be able to:

— certify;
— implement records management Human Resources;
— to enforce labor legislation in the practice of solving labor disputes;
— apply methods of conflict resolution in practice.

The content of the program

Section 1. The HR policy of the organization.

The role of HR to ensure the selection of experts, and other categories of workers to meet the needs of the organization. Personnel policy. HR audit. Evaluation of training. Certification of personnel. Provision for staff and work with them. Preparation for Advanced Training at the employer.

Section 2. Paperwork of Human Resources.

Requirements for registration of documents on staff (orders of hiring, transfer, dismissal, providing holidays). The procedure for registration and issuance of employee labor books. The order of registration of private affairs specialists and managers.

Section 3. The legal regulation of labor relations.

Civil contract, concept, content, order of the conclusion, modification and termination of the contract. Unlike a civil contract of employment. Contracted form of employment and its features. The jurisprudence of the termination of employment contracts on the initiative of the employer and the consideration of individual labor disputes. Consideration of practical examples to conclude contracts on the full liability.

Section 4. Protection of labor and responsibility of employees.

The role of HR is to ensure the protection and safety of the labour. Disciplinary responsibility of employees for violations of labor discipline. Nonpecuniary damage award as a way to protect the labor rights of citizens.

Section 5. The work of the personnel.

The tariff system of payroll. Rationing of working time and rest time.

Section 6. Psychology and ethics of business communication.

Psychology of business communication. Ethics and culture of the business relationship. Conflicts and ways to resolve them.

FOR FINAL TESTING

1. The procedure for registration of labor books workers.
2. Private business employee, the order of its formation.
3. HR outsourcing.
4. Preparation of documents for delivery to the archive.
5. The concept of personnel registry and provision of public servants.
6. The system works with reserve personnel.
7. The procedure and conditions for calculating length of service.
8. Job Description worker, its contents and approval.

9. Procedure and terms of contracts.

10. The difference between the contract and the agreement of employment.

11. The contents of the contract. The procedure for amending the provisions of the contract.

12. Termination of the contract.

13. Grounds for dismissal of an employee.

14. The order of dismissal of employees in the event of liquidation of the organization or reducing staffing levels.

15. Seniority and procedure for its calculation.

16. The types of state pensions.

17. Labour and social holidays, conditions and order of their presentation.

18. Benefits to employees, students in schools,

19. The benefits of women with children, young professionals and other categories of workers.

20. Legal grounds and procedure for removal from office workers.

21. Disciplinary measures and their application.

22. The responsibility of the employer for violation of labor laws.

23. The main provisions of the Law "On Combating Corruption".

24. Work with employees to prevent crimes, offenses and corruption.

25. Procedure for filling civil servants declarations of income and property.

26. The system of training of employees, the frequency of refresher training.

27. The ideological and educational work in the workforce. Directive President of the Republic of Belarus March 11, 2004 №1 «On measures to strengthen public safety and discipline."

8.3. MANAGERIAL COMPETENCE OF LINE MANAGERS

The objective - to form students systemic understanding of the modern principles, methods and techniques of management, and sustainable management skills of individual and joint activities of employees.

During the training the students should give an idea about the basic concepts and theories of modern management and organizational behavior; introduce the principles and methods used in modern management; show the dependence of all aspects of the quality of life organizations communication processes; familiarize with the controls individual and group behavior in an organizational context.

At the end of training courses, students:

must know:

— technology management and organizational behavior of staff;
— mechanisms of organizations;
— theories and models of individual and group behavior in organizations (decision making, joint activity, leadership, etc.);
— different management techniques on the structure of labor collectives;
— legal aspects of the rules and regulations of labor protection.

must be able to:

— diagnose problems in management and organizational behavior of staff;
— form the algorithm of desired behavior of their subordinates;
— manage key manufacturing processes within their functional responsibilities;
— take adequate situation management solutions based on existing regulations.

The content of the program

Section 1. Legal aspects of organization and safety.

The main functions of the master and the organization of its work. Work planning and production. Training of personnel in the workplace. The organization of work area.

Section 2. Management psychology of the staff.

Psychological techniques and skills. Conflict management. To the prevention of stress.

Section 3. The legislative and regulatory framework of labor protection in the Republic of Belarus.

Normative-legal acts. Investigation and registration of accidents at work and occupational diseases. Compensation for harm.

Section 4. Managerial effectiveness and leadership styles.

Planning a master of the team.

Management styles and their effectiveness.

Section 5. Effective time management.

Modes of work and rest. Performance and methods of improvement.

Section 6. Optimal planning of the manufacture process.

Flexible scheduling of the production process. The spatial organization of the production process. Logistics systems. Ratio and optimize time and resources.

Section 7. Support for management decision-making based on artificial intelligence systems.

Review of administrative decisions. Review of decision support systems (DSS). Solving practical problems by means of DSS.

Section 8. Cost management of manufacturing site.

The notion of costs, their classification for the purposes of calculation of the cost of production. Normative regulation of the order of formation of the cost of the Republic of Belarus. Cost Planning manufacturing site. Responsibility centers. Allocation of overhead costs of production area between products.

For final testing

1. Legislative and regulatory framework for the protection of labor in the Republic of Belarus.

2. Use of the Labor Code rules for disciplinary administrative decisions.

3. Differentiated and personalized system of employee motivation.

4. The main functions of the master and the organization of its work.

5. Key management principles.

6. Economic, social and psychological methods, applicability in modern management

7. The process of planning and production.

8. Develop a corporate culture in the workplace.

9. The concept and content of key business processes in manufacturing.

10. The communicative structure of the company and its mission.

11. The difference between the roles of management functions.

12. The training of personnel in the workplace.

13. Psychological methods of managing the workforce.

14. Conflict management. To the prevention of stress.

15. Investigation and registration of occupational accidents and occupational diseases. Compensation for harm.

16. Select and adapt management styles to their own activities.

17. The concept, types of conflicts and ways of resolving them.

18. Specificity control mixed groups: gender.

19.

20. Planning for the master of the team.

21. The effective management of their own time and the time of subordinates.

22. The work and rest.

23. The efficiency and methods of improvement.

24. Flexible scheduling of the production process.

25. The spatial organization of the production process. Logistics systems.

26. Value and optimization of time and resources.

27. Review of administrative decisions.

28. Review of decision support systems (DSS).

29. The solution of practical problems by means of DSS.

8.4. MARKETING SOFTWARE SALES

The main purpose is to develop knowledge and skills to design and organization of marketing management in enterprises; the methodology and methods of sales management, the content and order of application of the principles of marketing.

The main objectives of the discipline are:

- definition of marketing as a management concept and features that focus on the efficient use of capacity and resources of the enterprise to meet the demands of the market and make a profit;
- ability to generate and use the service marketing solutions for operational and strategic objectives of the enterprise, in collaboration with all other functional services of the enterprise;
- take coordinated decisions in the field of product, pricing, distribution and advertising policy, evaluate the impact of marketing efforts of the enterprise;
- understand the organizational, informational, research, planning and forecasting, and control and audit functions of marketing;
- understand that marketing in the firm extends to the number of basic functional activities, coordinating the work of all departments of the enterprise with a focus on market requirements.

As a result of studying the discipline, students:

must know the contents of the existing laws and regulations on the formation of the structures of marketing management, principles, methods and techniques of marketing management;

must be able to properly assess the condition of the marketing activities of organizations and management of the complex to organize marketing activities;

must have the skills to develop and implement targeted programs of marketing management.

The content of the discipline

Section 1. The preparation and conduct of effective exhibition activity

Training team to the exhibition and distribution of roles. Technology of work of each team member with consumers and competitors (marketing intelligence). Preparation of stand, advertising and other materials for the exhibition. Evaluating the impact of the exhibition activities.

Section 2. Technologies of telemarketing and telephone sales

Preparation and conduct of "cold" contacts with potential customers, using modern information and communication tools: E-mail, Skype, ICQ. The mechanism of "warm" and "hot" calls that send potential customers to the category of regular customers. 10 characteristics of the Master of transactions as the basis of effective sales techniques. Using the principle Sheard in the preparation and maintenance of VIP-clients.

Section 3. The mechanism of interaction between marketing and sales

SWOT-analysis of commercial potential of the company. The development objectives of: SMART-requirements and the Pareto principle. CRM-system: collection, analysis and use of information to manage client demand. Customer base and motivation system MAX. As marketers "to get into the shoes" of sellers.

Section 4. Internet marketing as a tool to identify and meet the needs of customers

Opportunities, techniques and technology of the modern Internet marketing. Development and use of a dynamic, multi-selling corporate website. The increase in sales of goods and comprehensive customer service through Internet technologies.

Section 5. Strategies to enter into deals with corporate VIP-clients

Zero stage of preparation for negotiations. Preparation of presentation materials and presentations. Using SNW-analysis to determine the purposes of commercial transactions. The strategy of integration into the business of VIP-clients

For final testing (questions offset)

1. Evolution of marketing concepts.

2. Current trends and tendencies in the development of marketing.

3. The essence of marketing management.

4. New trends in the development of the economy and the market, as factors in determining the evolution of marketing management.

5. Re-engineering of business processes as a tool for operational customer satisfaction.

6. Organization of alliances and marketing network as the management process to achieve competitive advantage.

7. Prospects for the use of direct and online marketing.

8. Creating and marketing management perspective business in services, entertainment and recreation, as well as high-tech.

9. Organization of marketing management.

10. Functional communication marketing and other departments.

11. The organizational structure of marketing services

12. Modern marketing management processes of integration in the overall management of the enterprise.

13. Professional requirements for specialists in the field of marketing.

14. Motivation marketing service.

15. Model of effective marketing organization.

16. Strategic marketing planning.

17. The role of marketing in the strategic planning of the company.

18. The process approach in the system of strategic planning.

19. Offensive marketing strategies to achieve competitive advantage.

20. The organization and functioning of the marketing department of the company. The mechanism of decision-making management of the companies on the tasks of marketing management

21. Classification, nomenclature and the range of goods in the global economy.

22. Commodity strategy.

23. Marketing of the product life cycle.

24. The quality and competitiveness of goods in the knowledge economy.

25. Evaluation of the company's competitive position in the market: SNW-analysis technique.

26. The Office of branded marketing.

27. Decisions on packaging and labels. Testing of the goods, brand and packaging

28. Management of Marketing Communications.

29. Various methods for determining the target audience contact.

30. The goals, objectives and marketing communications technology depending on socio-psiho-types of consumers.

31. Choice and control channels of marketing communications.

32. Pricing Strategy and management of distribution channels.

33. The impact on the pricing of major groups of stakeholders.

34. The basic methods and pricing strategies.

33. Channels of distribution of goods and management at the national and regional markets with SCC and TCC.

36. Management of Product life style (PLS).

8.5 SALARIES AND SOCIAL SECURITY IN A MARKET ECONOMY

The objective of the discipline - the formation of students understanding of the processes occurring in the social and labor of the country, changes in the strategy of the organization of wages, the establishment and functioning of the main components of social protection, to justify management decisions on these issues.

Tasks of the discipline:

— theoretical knowledge on modern organization of wages and the mechanism of formation of social guarantees in a market economy;
— study of the practice of formation and development of the organization of wages and social security;
— mastering the skills of technology systems development organization of wages in the enterprise;
— definition tools of effective regulation of social and labor guarantees of workers;
— compilation and analysis of contemporary features of social protection: pensions, social assistance, social security;
— acquainted with the peculiarities of foreign experience in the organization of wages and social security.

As a result of studying the discipline, students:

must know:

— theoretical foundations, history and practice of formation and development of the organization of wages and social security of workers;
— laws, concepts, normative legal documents defining the organizational and economic mechanism of wages, social security, social services and social protection.

must be able to:

— characterize and analyze the main trends and processes in the organization of wages and social security in our country and in the world;
— provide advice during the economic calculations required to inform management decisions in the field of wages and implementation of social guarantees for employees.

have the skills to:

— systems development organization flexible wage systems based on our scale of charges, commission remuneration system of floating rates and grades;
— assessment of the social protection of the population and workers' organizations;
— research achievements of other countries in this field, synthesis and evaluation of effective experience.

The content of the program

Topic 1. Wages as a major financial incentive to market conditions: principles, organization and methods of forming a payroll company.

Evaluating the effectiveness of the organization of wages in the enterprise by the direct method in terms of efficiency. Evaluating the effectiveness of the organization of wages based on the relative growth of labor productivity and wages.

Topic 2. Experience of implementing flexible systems of compensation of employees, allows employers to stimulate the growth of its productivity.

Remuneration based on wage scale organization. The calculation of the tariff rate of 1 category. Determination of the tariff part of wages on the basis of its own tariff system organization

Commission remuneration system: its variety, the benefits of application.

Calculation of wages based on the use of a fixed percentage of sales. Calculation of remuneration from the sale of a specific product

Remuneration of the use of "floating" salaries. Criteria for assessing the contribution of employee benefits application. The calculation of the salary for performance for the month.

Remuneration of using grades: application features. Establishing fork salary (min, mah). Determining the size of the salary premium (%).

Topic 3. Foreign experience of wage and its features.

American model with innovative programs of the organization wages. Structural and control logic wages in Japan. Western European system of staff incentives with individual wages.

Topic 4. Social Protection of the Republic of Belarus.

New trends in pension coverage for employees of the Republic of Belarus (later retirement, notional pension). Calculation of pensions and supplementary pension payout options. Social insurance and social security: a system of payments, their value depending on the category of citizens. Optional insurance for employees in the organization (within the life insurance, medical and others.): Insurance cases, the sources of coverage, conditions of payment. Social services and state targeted social assistance: the categories of recipients, criteria for, paid and free social services.

Topic 5: Social and labor warranty employee in the organization. Social protection of workers with dismissal.

Development of the social package organization.

Topic 6. Business communication and psychology of conflict.

Ethics and culture of the business relationship. Conflicts and ways to resolve them.

Topic 7. The strategy of flexible wage systems in the innovation economy.

For final testing

1. The essence and principles of the organization of wages
2. Methods of forming the payroll in the organization
3. The direct method of assessing the effectiveness of the organization of wages
4. Evaluation of the effectiveness of the organization of wages on the basis of the ratio of labor productivity growth and average wages
5. Remuneration based on the wage scale organization
6. The Commission wage system
7. Remuneration based on "floating" salary
8. Payment of using grades
9. Foreign experience of the organization of wages and its features
10. The possibility of using foreign experience in the organization of wages in Belarus
11. The main components of the social protection system
12. Incentive Scheme for later retirement
13. The notional pension
14. The mechanism for calculating pensions
15. Types of social security
16. The system of insurance payments in Belarus
17. Sources of financing the social security system
18. State targeted assistance, the criteria of its
19. Purpose, objectives of social services
20. Categories of beneficiaries of social services, both free and paid services
21. Social benefits employees in the organization
22. Social and labor warranty employee in the organization
23. The system of social guarantees employee severance
24. The social protection of workers in the organization

CONCLUSIONS:

1. Despite of difference of structural divisions all Belarusian universities have strong system of industrial personnel retraining. Every year each university increases a number of training courses in accordance with its specializations and industries needs. Existing system can be considered as the base for development of e-learning courses for specialists of textile, chemical and other enterprises.
2. Specialists and managers of Belarusian enterprises agree that the staff should to improve the qualification regularly. But they have limited and insufficient information about of e-learning advantage. So, it is necessary to provide wide advertising of this form of education for its promotion in industry.
3. As a result of the survey the lists of e-learning courses were developed for different industrial branches (textile, garment, chemical enterprises) on the base of their educational needs. These courses include technological, economical, linguistic and other questions. Professors of 3 Belarusian universities have prepared these courses programs.