

Catalogue on Research and Innovation potential of the University of Banja Luka



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WBCInno - Modernization of WBC universities through strengthening of structures and services for knowledge transfer, research and innovation

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Preface

The University of Banja Luka, together with sixteen partners from the European Union and the Western Balkans Region, has been implementing the TEMPUS project WBCInno entitled: "Modernisation of WBC Universities Through Strengthening of Structures and Services for Knowledge Transfer, Research and Innovations" since October 2012. One of the innovative goals of the Project is developing the Regional university innovative platform, preceded by mapping of research and innovation potentials at five universities in the Region, which participate in the Project: the University of Kragujevac, the University of Novi Sad, the University of Montenegro, the University of Zenica and the University of Banja Luka.

The first step was developing mapping methodology and the corresponding questionnaire, with well-structured questions which provide collecting data on research infrastructure, laboratories, centres, research teams with significant results and/or innovation potential. Another goal is also to collect information on valuable research results, developed technologies, software, patents, licences, specific methodologies, training, commercial services, laboratory tests which can be both commercialized and offered to users outside the University, above all to the regional enterprises, as well as to the users at the University, aiming at knowledge transfer, research and innovations.

Except for the review of a part of the research in this printed edition of the Catalogue, developing of the electronic catalogue (HTML), which enables continuous data entering, managing and generating specific reports for the needs of monitoring research and innovation activities at the University, is in progress. Beside that, searching data base according to various criteria by external users as well as easy connection of stakeholders (researchers, enterprises, innovators, investors etc.), which encourages commercialization of research results and innovations in the market, will be possible.

The Catalogue is structured in three chapters. The first introductory chapter contains basic general information about the University of Banja Luka. The second part gives an overview of the established structures and mechanisms of the University who are engaged in scientific research at the university and encourage the transfer of knowledge, advanced research and innovation. The third chapter represents the essential part of the Catalogue. It presents the centres and laboratories of the University of Banja Luka describing their activities, results, resources, projects (domestic and international), key personnel, as well as provided commercial services, technical solutions, patents, prototypes and other measurable results of the research that have commercial and innovation potential.

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The intention is to publish editions of the catalogue annually, so that the said edition presents the centres and laboratories which have responded to this initiative and submitted the necessary information by filling in the questionnaires for quality presentation of their potential. We expect the continuous process of mapping research resources of the University in the future to result in finding interest of other research groups at the University in being presented in the Catalogue, which will allow a better long-term application of research results in the region, knowledge transfer and innovation development.

Preface

On behalf of the Project team of the University of Banja Luka we would like to thank all the colleagues from the WBCInno Project Team who prepared the project materials as well as to the colleagues from the University of Banja Luka who submitted the materials on behalf of the centres and laboratories which they represent and in that way contributed to the quality of this Catalogue.

Banja Luka: February, 2014.

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4. Addition- Classification of research

UNIVERSITY OF BANJA LUKA

The University of Banja Luka has been established on 7th November 1975. At the time the University consisted of five faculties: Faculty of Electrical Engineering, Technology, Mechanical Engineering, Law and Economics, as well as three higher schools. The other faculties were founded later: Medicine in 1978, Agriculture in 1992, Forestry in 1992, Philosophy in 1994, Architecture and Civil Engineering in 1995, Natural Sciences and Mathematics in 1996, Academy of Art in 1999 and Physical Education and Sports in 2001. The Faculty of Philology, Faculty of Political Sciences and Faculty of Mine Engineering have been established in 2009. Since 2012. The associate member of the University's Graduate School of Interior (Table 1). Most of the faculties of the University of Banja Luka, as well as university halls of residence with student dormitories, restaurants, recreation centers, student clubs and the University Computer Center are situated in two campuses, located close to the river Vrbas and not far from the city center. The University of Banja Luka has adequate various in size and shape classrooms, amphitheatres, medium and smaller classrooms, reading rooms and libraries, laboratories and computer rooms. Total size of classrooms is around 16 000 square meters, laboratories around 10 000 square meters. Most of the classrooms are equipped with video projectors and computers for display digital teaching contents. Procurement of interactive electronic boards, so called "smart" boards, is planned for the next period. The University has over 20 computer rooms with 24 hour internet access. Libraries of the University have around 185.000 books and they are subscribed to many scientific magazines.

Since January 2008 the University of Banja Luka is integrated, with faculties as its organizational units. The Steering Board, Senate and Rector govern the University. The Rector legally represents the University. There are four Vice-Rectors (in charge of: research and scientific work, international relations, teaching and student issues and human resources and other issues). The Steering Board is the managerial body of the University. It consists of eleven members: five representatives of academic staff, one representative of non-academic staff, one representative of students and four members appointed by the government. The University Senate is the highest academic body, which discusses all academic issues and has twenty-nine members: one representative of academic staff from each organizational unit (18), six representatives of students, Rector and four Vice-Rectors.

Student Parliament is the student representative body at the University of Banja Luka and have all the rights and obligations defined by the Law on Higher Education and the University Statute. Constituted by the Law on Higher Education in april 2008. year, consisting of three representatives from each unit. The mandate of the Student Parliament is one year, and students are elected by direct and secret ballot at their faculties. All students enrolled in the current school year are eligible to vote and to be elected as a member of the Student Parliament. One of the important activities of the Students' Parliament is the organization of scientific conference " Students of Science", which is held once a year in which their first exhibited works by students from the entire region.

University of Banja Luka and individual faculty / academy of art in its composition have concluded (1975-2013) about two hundred agreements with universities and scientific institutions in the Republika Srpska, Bosnia and Herzegovina and the following countries : Bulgaria, Italy, Japan, Macedonia, Norway, Poland, Russia, Slovenia, Serbia, Thailand, Ukraine, Finland, France, Croatia, Montenegro, the USA, Germany, Portugal, Slovakia, Turkey, Romania, Spain and others. In the framework of joint participation in projects TEMPUS and FP 6 and FP 7 Cooperation took place with other higher education and research institutions in Europe. International projects funded by : the European Commission, the Council of Europe, the United Nations, UNESCO - CEPES, the World Bank and the governments of several countries. Intense and cooperation with foreign embassies in Bosnia and Herzegovina, as well as numerous international governmental and non-governmental organizations (through exchange of information and participation in programs awarding scholarships, exchange of students and academic staff, summer school, opportunities to study, work and volunteering, as well as performing working abroad).

More information about University activities and updates on www.unibl.org.

Akademija umjetnosti **Academy of Arts**

Phone/Fax: +387 51 348 800; 348 805
E-mail: info@aubl.org
www: au.unibl.org

Arhitektonsko-građevinsko-geodetski fakultet **Faculty of Architecture, Civil Engineering and Geodesy**

Phone/Fax: +387 51 462 543
E-mail: info@agfbl.org
www: agf.unibl.org

Ekonomski fakultet **Faculty of Economics**

Phone/Fax: +387 51 430 010; 430 053
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www: ef.unibl.org

Elektrotehnički fakultet **Faculty of Electrical Engineering**

Phone/Fax: +387 51 221 824; 211 408
E-mail: office@etfbl.net
www: etf.unibl.org

Mašinski fakultet **Faculty of Mechanical**

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Medicinski fakultet **Faculty of Medicine**

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E-mail: medicinskifakultetbl@yahoo.com
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Poljoprivredni fakultet **Faculty of Agriculture**

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E-mail: dekanat@agrofabl.org
www: agrofabl.org

Pravni fakultet **Faculty of Law**

Phone/Fax: +387 51 339 000; 460 602
E-mail: dekanat@pravobl.com
www: pravobl.com

Prirodno-matematički fakultet **Faculty of Natural Sciences and Mathematics**

Phone/Fax: +387 51 319 142; 311 178
E-mail: sekretarica@pmfbl.org
www: pmf.unibl.org

Rudarski fakultet **Faculty of Mine Engineering**

Phone/Fax: +387 52 241 660; 241 660
E-mail: rudarskifakultet@unibl.rs
www: rf.unibl.org

Tehnološki fakultet **Faculty of Technology**

Phone/Fax: +387 51 434 357; 434 351
E-mail: info@tfbl.org
www: tf.unibl.org

Fakultet političkih nauka **Faculty of Political Sciences**

Phone/Fax: +387 51 323 630
E-mail: info@fpn.org
www: fpn.unibl.org

Fakultet fizičkog vaspitanja i sporta **Faculty of Physical Education and Sports**

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Filološki fakultet **Faculty of Philology**

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Filozofski fakultet **Faculty of Philosophy**

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E-mail: fil.fakultet@blic.net
www: ff.unibl.org

Šumarski fakultet **Faculty of Forestry**

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E-mail: dekanat@sfbl.org
www: sfbl.org

Institut za genetičke resurse **Genetic Resources Institute**

Phone/Fax: +387 51 348 080; 348 089
E-mail: info@grunibl.rs.ba
www: grunibl.org

Visoka škola unutrašnjih poslova **Police College**

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E-mail: direktor_vsup@education.muprs.org
www: education.muprs.org

The number and distribution of employees by positions and organizational units of the University of Banja Luka is shown in Table 2

Tabela 2. Schedule of employees of organization units at the University

	Academy of Arts	Faculty of Architecture, Civil Engineering and Geodesy	Faculty of Economics	Faculty of Electrical Engineering	Faculty of Mechanical Engineering	Faculty of Medicine	Faculty of Agriculture	Faculty of Law	Faculty of Natural Sciences and Math	Faculty of Mine Engineering	Faculty of Technology	Faculty of Political Sciences	Faculty of Physical Education and Sp	Faculty of Philology	Faculty of Philosophy	Faculty of Forestry	
Full Professor	3	2	11	3	6	7	9	9	6	1	10	4	3	2	7	4	87
Associate professors	11	4	6	6	7	8	5	2	9	0	5	2	5	6	8	3	87
Assistant Professors	28	4	9	6	13	2	12	2	17	5	6	10	9	19	16	4	162
Senior Assistants	6	17	12	11	9	25	20	3	23	1	13	7	10	13	21	12	203
Assistants	11	15	11	15	6	25	2	8	22	5	2	10	3	15	14	2	166
Lectors	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	8
Total	59	42	49	41	41	67	48	24	77	12	36	33	30	63	66	25	713
Ph.D.	4	10	31	16	26	18	28	14	34	6	21	16	19	27	31	11	312
Master of Science	27	10	14	11	9	25	20	3	24	1	13	11	8	14	20	14	224
Master	0	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	5
Specialist	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Without titles	27	22	0	14	6	24	0	7	19	5	2	5	3	22	15	0	171
Total	59	42	49	41	41	67	48	24	77	12	36	33	30	63	66	25	713

Institute of Genetic Resources has employed researchers and professional associates, therefore non-teaching staff, and 3 senior researchers and 4 researchers. Doctors of Sciences of the Institute are teachers engaged in regular activities and projects of the Institute, for now.

2. Scientific and research work at the University

The new Law on Higher Education in the Republika Srpska allows the formation of the scientific institutes at the level of the Faculty / Academy of Arts, and at the University level for multidisciplinary research. Table 3 provides an overview of the existing institutes at the University of Banja Luka.

Tabela 3. Overview of of the Institute at the University of Banja Luka

Organizational Unit	Name of Institute
University of Banja Luka	Institute of Genetic Resources
Faculty of Architecture, Civil Engineering and Geodesy	Institute of Architecture, Civil Engineering and Geodesy
Faculty of Economics	Institute of Economic Sciences
Faculty of Electrical Engineering	Research and development institute for information and communication technology Research and Development Institute for Magnetics
Faculty of Mechanical Engineering	Institute of Mechatronics Institute for engines, vehicles and materials
Faculty of Medicine	Institute for Health Management
Faculty of Law	Institute for Legal and Social Sciences Institute for International Business and legal cooperation
Faculty of Agriculture	Institute of Animal Husbandry Institute of Agroecology and land Institute of Pomology, Viticulture and Horticulture Institute of Field and Vegetable Crops Institute of Agricultural Economics
Faculty of Philology	Institute for Interdisciplinary social sciences and humanities -
Faculty of Philosophy	INDUS
Faculty of Technology	Institute for Technological Research, Development and Design
Faculty of Physical Education and Sport	Sports Institute of the Faculty of physical education and sport Banja Luka
Faculty of Political Sciences	Institute for Social Research, Faculty of Political Sciences

Scientific and research activity is realized through adequate laboratory space, equipped library and modern technical tools that make it easier the presentation of the results obtained. University of Banja Luka has laboratory space and equipment. Schedule laboratory and computer room at the University is presented in Table 4 At the University of Banja Luka, there are 14 libraries and reading rooms with a substantial fund monographs, serials and other scientific publications.

Table 4 The number of laboratories, computer room and computers

Faculty / Academy	Laboratory	Computer room	Computers
Academy of Arts	16	1	39
Faculty of Architecture, Civil Engineering and Geodesy	-	2	82
Faculty of Economics	1	2	94
Faculty of Electrical Engineering	13	3	150
Faculty of Mechanical Engineering	10	1	90
Faculty of Medicine	10	1	130
Faculty of Agriculture	20	1	139
Faculty of Law	-	-	64
Faculty of Natural Sciences and Mathematics	11	2	120
Faculty of Mine Engineering	1	1	24
Faculty of Technology	13	2	75
Faculty of Political Sciences	-	-	15
Faculty of Physical Education and Sports	1	1	40
Faculty of Philology	-	-	39
Faculty of Philosophy	1	1	80
Faculty of Forestry	3	1	28
Institute of Genetic Resources	6	-	17

In view to regulating the field of publishing scientific publications in the Republika Srpska Ministry of Science and Technology has issued Regulations on publishing of the scientific publications ("Official Gazette of the Republika Srpska" no. 77/10). Currently at the University printed following magazines (recognized and ranked by the Ministry of Science and Technology in the Government of the Republika Srpska (Table 5)).

Table 5 List of scientific journals at the University of Banja Luka, which are categorized in accordance with Regulations on the publishing of the scientific publications

	Name of journal	Publisher	web-site
1	SPORTLOGIA	Faculty of Physical Education and Sports	http://www.sportlogia.com/
2	HERALD of chemisties, Technologies and Ecologies RS	Phaculty of Technology	http://glasnik.tfbf.org/
3	PHILOLOGIST	Fakulty of Phylology	http://flf.unibl.org/?sec=9
4	ACTA ECONOMICA	Faculty of Economics	http://www.actaeconomica.efbl.org/
5	AGROKNOWLEDGE	Faculty of Agriculture	http://doisrpska.nub.rs/index.php/agroznanje
6	YEARBOOK of Faculty of Low	Faculty of Low	http://www.godisnjakpf.rs/
7	SERBIAN LEGAL THOUGHT	Faculty of Low	http://www.spmisao.rs/
8	POLITEIA	Faculty of Political Sciences	http://fpnbl.org/index.php?option=com_content&view=article&id=216&Itemid=94

During the 2013th The at the University is realized more than 100 scientific research projects. Overview of projects whose implementation is in progress is shown in Table 6
More details of scientific research at the University at

Table 6. Overview of project at the University of Banja Luka during 2013 years

Organizational Unit	International projects					National projects	Total
	FP7	IPA	HERD	TEMPUS	Others		
Academy of Arts							
Faculty of Architecture, Civil Engineering and Geodesy				1	2		3
Faculty of Economics					1	1	2
Faculty of Electrical Engineering	2		1	2	1	14	20
Faculty of Mechanical Engineering		1		2	4	5	12
Faculty of Medicine						5	5
Faculty of Agriculture			2	2	3	6	13
Faculti of Low					1		1
Faculty of Natural Sciences and Mathematics				1			3
Faculty of Mine Engineering					1		1
Faculty of Technology				1	2	9	12
Faculty of Political Sciences							
Faculty of Physical Education and Sports						1	1
Faculty of Philology				1		2	3
Faculty of Philosophy						7	7
Faculty of Forestry					2	6	8
Institute of Genetic Resources						4	4
Rectorate			2	5	2		9
Total	2	1	5	15	19	62	104

University Relation with environment, the economy and the social partners

The University is interested in the progress of the local community and the whole society and therefore that the Community will offer its intellectual potential, its businesses, organizations and institutions. Our goal is to cooperate closely with all departments of public interest, the Chamber of Commerce, Bureau of Statistics, Employment Agency and other institutions.

According to the Government or its departments and bodies of the University has partnership and proactive attitude, because the construction of the modern university that will accelerate the development of economy and society, and so fulfill their social duties common objective.

In addition to teaching at the university have developed remarkable academic and cultural activities. Each college has established some form of public presentation. Some universities organize annual or biennial scientific conferences, publish newsletters scientific papers, scientific journals and the like.

University the entrepreneurial center

University the entrepreneurial center has existed since November 2009. The sector as a department of scientific research, with the primary task of strengthening cooperation between universities and industry.

For this purpose, the Centre works to strengthen the participation of the University in creating a favorable environment for economic and social development based on knowledge and is focused on the development of human and material resources, promoting innovative thinking and the development of entrepreneurial culture, and stimulation of entrepreneurship, innovation and enterprise development.

The Centre's activities cover three areas: entrepreneurship development, career development and the development of scientific research to the needs of the economy, which is osvaruje following goals and objectives:

- The promotion and development of innovation and entrepreneurship within the student and teacher population
- Support the development of firms originating in the academic community
- Facilitating the transition of students into the labor market
- Mediation in achieving cooperation between academia and industry
- Capacity building of the University and businesses for the purpose of cooperation and development
- Assist in the implementation of scientific research projects for the economy
- Help the entrepreneurial innovators and people in developing business ideas
- Help the economy to stronger business growth and development (through transfer of technology, knowledge and resources)
- Support the development of technology parks, innovation centers and incubators in BiH Promotion and enhancement of international cooperation in project and program basis;
- Motivation, infromisanje, education and counseling entrepreneurs
- The organization of non-formal education programs
- Implementation of research and development projects (national, interstate and international)
- Preparation of development strategies, investment studies and reports, and business plans.

Entrepreneurship development

The center is a unique place for entrepreneurship development, with special emphasis on supporting entrepreneurship and the creation of the student population. Support services are tailored to the stage of development of entrepreneurs and the needs of each individual user, and in accordance with that provided by subroutines for strengthening youth orientation toward self-employment and entrepreneurship.

Entrepreneurship development

Potential young entrepreneurs who are not yet ready to implement a business enterprise can use the service to build entrepreneurial capacity. To this end, the Centre is a place where potential young entrepreneurs can come to constructively spend their free time, build your knowledge, inform and participate in educational programs, get help, information, guidance or professional advice related to starting and running businesses.

When services for potential entrepreneurs emphasis is placed on training and education for entrepreneurship, information, mentoring, counseling, networking with experienced entrepreneurs and other young entrepreneurs and organization practice for future entrepreneurs.

Active young entrepreneurs who have a specific business idea and want to deliver it can make use of the following services: counseling, mentoring, business training, use of office space in the center and rooms for meetings and conferences, participation in round tables, workshops, lectures and other events business networking. In addition, they provided support in the preparation and development of a business plan; assistance in registering the company, prepare prototypes and specifications of products / services and asistenciija in finding financial resources, investors and investment opportunities.

Student Garden Business - business concept of the garden is a Norwegian model of a business incubator for rural and undeveloped regions. UPC 's program " Business Student Garden " is a modification of this model, financially supported by the Ministry of Foreign Affairs of the Kingdom of Norway and Innovation Centre Banja Luka, aimed at the specific needs of students studying at the University of Banja Luka, and who come from disadvantaged backgrounds and want to start their own business in the place from which they come, upon graduation.

Within the PCM operates Career Center, which aims to increase the percentage of employment of students after graduation, you realize through various program activities and direct work with students. Career Center implemented a variety of programs for training, gaining practical knowledge and experience for the students of the University of Banja Luka, and it independently and in cooperation with universities and student associations on the implementation of joint projects. In doing so, the Center provides analysis and monitoring of the situation in the field of implementation of programs and activities to gain practical knowledge and experience, proposed and implemented actions to improve compliance knowledge and skills of students with the needs of the labor market, and asisitira in the implementation of activities in this domain other actors within and outside the University.

Direct work with students on a daily basis include:

- providing training, assistance and advice in preparing the biography, accompanying letters and job applications, preparing for interviews (through one-on - one approach and / or workshops for groups);
- workshops, trainings and seminars, "soft" skills, as well as special education and training programs (educational cycles for entrepreneurship; program to acquire practical experience and knowledge, project cycle management, program development leader, themed specialized training for different educational profiles);
- Facilitating meetings with employers through a variety of events and happenings, and implementation practices;
- the organization and practice of volunteering.

In addition, the Centre creates and maintains contacts to potential employers, and allows them to easily and reliably selecting students, mediation in the process of selection of students, and, if necessary, participation in the work of the practitioner through mentorstava and additional education student. Services for employers include the organization and facilitate participation in student projects, competitions and implementation of workshops and lectures for employers.

Research and development and cooperation with industry

For the purpose of strengthening cooperation between universities and industry in the field of research and development, UPC mediating knowledge and technology transfer between academia and industry, while coordinating research at the University of Banja Luka with the needs of the economy, addressing the specific requirements of the economy by facilitating access to existing research and technical capacities of the University, as well as strengthening the capacity of the University in cooperation with industry.

Within this field operates Office for cooperation with industry in the area of research and development that works on the following goals and tasks :

- Creating and maintaining close relationships with businesses;
- Strengthening the capacity of research and development at the University of Banja Luka;
- Building the infrastructure for collaboration between universities and enterprises and the transfer of knowledge and technology;
- Communicating the results of research partners from industry and disclosure wider community;
- Work on the protection of intellectual property rights in research projects;
- Generating cooperation with industry -based research and education;
- Coordinating the implementation of joint research projects;

Find a topic for research and dissertations from the business community and the allocation of themes and projects to students and academic staff;

Services to entrepreneurs and companies from the region under commercial conditions, independently and in cooperation with universities include:

- Technological and organizational planning, business diagnostics, marketing consulting, market information and market research; specialized advice in relation to the reference branch of the economy, assisting in finding investors including service documentation preparation, business and strategic planning, development, launch and enhancement of products; services professional project management;
- Coordination of implementation research and scientific endeavor and work;
- Finding, training, preparation, allocation and supervision of students working on projects in which participating center.

The Center also offers professional services project cycle management for the University, with a special emphasis on the teaching staff of the University, and commercial services to third parties. Services include design and preparation of project proposals, managing the implementation of the project, the funding of the implementation of the project, creating the project consortium and training in project management.

In addition, the Centre provides services development strategies and study their proposals and compete in (local, national, regional, international) calls for projects, and actively seeking funding for projects, for their own purposes, for clients and partners. Areas of primary interest in this domain are to encourage cooperation between academia with industry, promotion and development of entrepreneurship, human resources, companies, industries and local communities, development of infrastructure to support economic development and the establishment of an innovation ecosystem, as well as all other activities that can contribute to economic development of Bosnia and Herzegovina.

In the Center operates offices EURAXESS. EURAXESS network is a useful tool for organizing the mobility of researchers in Europe and a very valuable tool for overcoming the problems in the exchange of knowledge and experience in the field of science and technology. Represents a pan- European initiative, supported by 37 countries, as well as a unique place to access information from all of these countries, including places of providing immediate, personalized service to researchers who wish to continue their career in a European country.

3. PRESENTATION OF LABORATORIES, INSTITUTES AND CENTERS AT THE UNIVERSITY

Faculty of Architecture, Civil Engineering and Geodesy

- Laboratory for Building Physics and Energy Efficiency of Buildings

Faculty of Electrical Engineering

- Laboratory for Automatics
- Laboratory for Digital Signal Processing
- ICT Academy
- Laboratory of Power Engineering
- Laboratory of Electronics
- Laboratory of General Electrical Engineering
- Laboratory for Computer networks
- Laboratory for safety computer systems
- Laboratory for software systems

Faculty of Physical Education and Sport

- Institute of Sport

Faculty of Mechanical Engineering

- Cooperative Training Centre Banja Luka
- Laboratory for Intelligent Systems

Faculty of Agriculture

- Husbandry Institute
- Institute for Agroecology and land
- Institute of Agricultural Economics
- Institute for Animal Husbandry
- Institute of Horticulture

Institute of Genetic Resources

- Biodiversity Center
- Sustainable use Center



Objectives and activities

- Measurement and analysis of the physical parameters that determine the energy efficiency of buildings (wrappers) and comfort in the workplace.
- Equipping laboratories.
- Creating a catalog of building thermal insulation materials.
- The teaching process.
- Making a master degree papers.
- Perform scientific research projects in the field of building energy efficiency and comfort in the workplace.
- Publication of scientific papers in journals and at conferences of national and international importance.
- Making the final papers for the I, II and III study cycle.
- Improving the quality of teaching in the program of study buildings and architecture with the use of modern laboratory equipment.
- Establishing a scientific and technical cooperation with relevant institutions in BiH and the region.
- Creating a basis for inclusion in European projects.

Results

- Performed scientific research project : Energy efficiency in the construction industry within which they discussed the energy performance of Rectorate buildings and the Faculty of Philology, the same power and give recommendations for their improvement measures.
- The measured noise levels and analyzed acoustic comfort of employees at the University of Banja Luka.
- Analyzed the thermal characteristics of the building envelope Rectorate.
- Analyzed the thermal comfort of employees at the University of Banja Luka on the basis of the survey results.
- Conducted analysis of the noise level in the work environment in the Fund for Environmental Protection RS.
- The published scientific and technical papers at conferences of national and international importance in the field of building energy efficiency and comfort in the workplace.

Key staff

- Prof. Dr. Milenko Stankovic
- Prof. Dr. Ljubisa Preradović
- Dr Biljana Antunovic
- Gordana Broćeta
- Darija Gajic
- Aleksandar Jankovic



The most important projects

International projects (FP7, CIP, Tempus, Erasmus, LLL, COST, EUREKA, etc.)
National projects Energy efficiency in building realized 2011th with the support of the Ministry of Science and Technology of RS.

The most important prototypes / products / services

- Tests energy performance of buildings and building envelope
- Demonstration tests as part of the education of students and engineers in the field of energy efficiency in buildings.

The most important equipment and software

- Multifunction Data Logger for measuring thermal transmittance and comfort parameters Ahlborn Almemo 2690-8
- Thermal imaging camera Flir B60
- A device for measuring the noise level and frequency analysis Bruel & Kjaer 2270
- Data logger for measuring temperature and relative humidity Testo Testo 174T and 174H
- ENSI software for the energy efficiency of buildings
- Software for archiving, processing and presentation of the results of all measured values

Commercial Services

- Measurement of physical parametarakoji describe the thermal characteristics of the building envelope (a measure of thermal transmittance and thermographic recording facility) and to determine the current and the actual situation on the spot and the conditions in which the building is used;
- Measurement of parameters of comfort working environment (temperature, relative humidity and velocity, brightness and noise levels in the workplace);
- Providing appropriate energy efficient design solutions in order to achieve the required quality and to increase the overall energy efficiency of buildings, especially in terms of reducing the specific energy loss and improve comfort in them;
- Energy audit of buildings;

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Objectives and activities

- To establish links between universities and companies through the development of new models of cooperation modeled on the proven and successful models of the EU;
- Provide services to improve existing and develop new innovative products;
- Provide high-quality and versatile research result, which will run regular funding and implementation of innovation in enterprises;
- Develop new and modernize existing vocational training programs to the needs of enterprises and the labor market;

Results

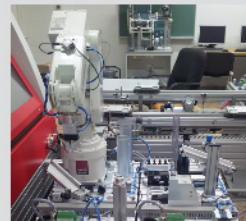
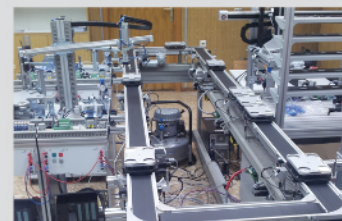
- Drafting graduate and masters degree theses and doctoral dissertations
- Realization of student competitions (Hardware & Software)
- Establishing a 1Gbps connection (SEEREN2 project) Faculty of Electrical Engineering in Banja Luka with GEANT2 network 06.12.2006.
- Realized specialist training:
 - on PLC programming,
 - on the design and programming of SCADA systems.
- Realized project new lab: Laboratory of Automatics, Laboratory of Robotics.
- Realized a few TEMPUS and FP7 projects funded by the Government of RS.

Key staff

- Prof. Dr. Milorad Božić
- Prof. Dr. Petar Maric
- Dr Igor Krcmar
- Dino Kosić
- Velibor Đalić

The most important projects

- EU FP6 Project acronym: SEEREN2, Project full title: South Eastern European Research and Education Network, Contract no.: 026748, University of Banja Luka, Faculty of Electrical Engineering, Third Party to BIHARNET, 2005-2008
- EU FP7- Infrastructures, Project acronym: SEEGRID - SCI, Activity: INFRA - 1.2 - 0.2 - New user communities, Contract no.: 211338, University of Banja Luka, Faculty of Electrical Engineering, Contractor for B & H, 2008-2010
- EU FP7, High Performance Computing Infrastructure for South East Europe 's Research Communities Project Acronym: HP -SEE, Contract n ° RI-261499, 2010-2013 (in progress)
- EU FP7, Integrated Sustainable Pan - European Infrastructure for Researchers in Europe Project Acronym: EGI - INSPIRE Contract n ° RI - 261323, 2010-2014 (in progress)
- Project of the Ministry of Science and Technology, Government of RS, " The system for collecting, storing, displaying and processing of meteorological stations GRID – METSTARS "Report for the first year (01.12.2007-01.12.2008.), 2008th



The most important projects

- Project of the Ministry of Science and Technology, Government of RS, " The system for collecting, storing, displaying and processing of meteorological stations GRID – METSTARS" Report for the second year (2010-2011), May 2011th
- Modernization of the WBC universities through strengthening of structures and services for knowledge transfer, research and innovation (530213 - TEMPUS -1-2012-1- RS – TEMPUS - JPHE), European Commission, 2012-2015
- Towards Sustainable and Equitable Financing of Higher Education in Bosnia and Herzegovina, Montenegro and Serbia (530550 - TEMPUS -1-2012-1- RS - TEMPUS – SMGR), European Commission, 2012-2015.
- Benchmarking as a Tool for Improvement of Higher Education Institution Performance (530696 - TEMPUS -1-2012-1- DE - TEMPUS - SMGR), European Commission, 2012-2015.
- Norwegian Bosnian - based Technology Transfer for Sustainable Systems Engineering and Embedded Systems in the field of Cloud Computing and Digital Signal Processing, HERD OF ICT NORBOTTECH, Ministry of Foreign Affairs of Norway, 2011-2014.

The most important prototypes / products / services

Specialized Training: Programming PLC, the design and programming of SCADA systems

The most important equipment and software

- Flexible production line (MPS 500) - conveyor belt with seven cells : distribution, testing, processing, processing, preparation, assembly and storage. Cells for the preparation and assembly consisting of industrial robots and CNC machines. Other stations are controlled by PLCs.
- A system with two reservoirs (MPS - PA) and the possibility to control the level, flow, temperature and pressure. Driven PLC or via computer.
- Platform with Robix manipulator and camera-7 platform.
- A system with three reservoirs (DTS 200 - manufacturer AMIRA) - A system with three tanks, two motorized valves, two pumps, and various sensors to operator display, driven PLC.
- Siemens Simatic Step 7,
- Siemens Simatic WinCC
- RSLogix500,
- RSView32,
- VisualDesigner
- Festo Didactic Ciros Automation Suite (Studio, Robotics, Mechatronics)

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Objectives and activities

Research, development and education in the field of digital signal processing, publication of research results in reputable journals and conferences, and the establishment of cooperation with other academic communities and the economy. Laboratory activities include the development of algorithms, architectures and systems for digital signal processing, the implementation of algorithms for digital signal processing on a variety of platforms such as PC, GPU, DSP and FPGA signal processing in real-time processing and analysis of medical images, compression of radiological images, radio-frequency identification (RFID), automatic positioning using RFID technology and computer vision, automatic classification covers and ways of land use on aero-video, image fusion, processing and analysis of the video signal, eye iris recognition, digitization of cultural heritage, signal processing in bio- nano communication.

Results

The most important results of the laboratory include new circuits for digital signal processing, new algorithms for signal processing in real-time compression of radiological images, the classification of aero images, multifocus image fusion, histopathological analysis of images, new applications of RFID technology, videoconferencing systems, digitization of cultural heritage in collaboration with the National and university Library of the Republic of Serbia, development of materials for eLearning in the areas of action laboratories. Laboratory operates a number of years, so it is important to note that in 1990, in cooperation with the factory Rudi Čajavec well developed prototype spectrophotometer.

Key staff

The most important projects

- Signal processing in bio - nano - nication, co-ordinator of the project (Ministry of Science and Technology of the Republika Srpska, 2012-2013)
- Automatic classification coverage and ways of land use, project coordinator (Ministry of Science and Technology of the Republika Srpska, 2011-2013)
- NORBOTECH - Norwegian Bosnian - based Technology Transfer for Sustainable Systems Engineering and Embedded Systems in the fields of Cloud Computing and Digital Signal Processing (Norwegian Ministry of Foreign Affairs, 2011-2014)
- NOR - BA - S - Norwegian -Bosnian and Serbian cooperation platform for university and industry in ICT R & D (Norwegian Ministry of Foreign Affairs, 2011-2014)
- 204625 - EM -1-2011-1- SE- ERA MUNDUS - EMA21 "Euroweb: European Research and Education Collaboration with Western Balkans", 2011-2015, project coordinator for the University of Banja Luka
- Development of dialogue systems for the Serbian and other South Slavic languages (Ministry of Science and Technological Development of Republic of Serbia, 2011-2014)

The most important projects

- Lossless image compression, project coordinator (Ministry of Science and Technology of the Republika Srpska, 2009-2010)
- Medical Images Compression bilateral Project Bosnia and Herzegovina - Slovenia, project coordinator for Bosnia and Herzegovina, (Ministry of Civil Affairs Bosnia and Herzegovina, 2009)
- RFID technology, project coordinator (ETF Banja Luka and the Ministry of Science and Technology of the Republika Srpska, 2008-2010)
- Testing of functional and technical characteristics of the components of the fiscal system (Project Coordinator, ETF Banja Luka, since 2008)

The most important prototypes / products / services

- Testing of functional and technical characteristics of the components of the fiscal system, the Tax Administration, Ministry of Finance and Ministry of Trade and Tourism.

Entrepreneurial / specialized training

- Real-time DSP for students and engineers
- Training of Trainers City Administration: Access, Corel, Excel, Internet
- Training of Trainers City Administration in the field of computer science: AutoCAD Corel, Excel, Internet
- Retraining of primary school teachers for teachers Informatics (2001-2003).

The most important equipment and software

- Graphics workstation,
- Developing systems for DSP Analog Devices ADZS - 21489 - EZLITE Evaluation Kit <http://www.analog.com/en/evaluation/21489-ezlite/eb.html>,
- Developing systems for Texas Instruments DSP LDK 5510 <http://c5000.spectrumdigital.com/dsk5510/>
- FPGA development system,
- Developing a system for RFID,
- Developing a system for Texas Instruments OMAP,
- Thermal Imaging Camera,
- Iris recognition system,

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Objectives and activities

Local CISCO Academy was established in July 2004th year. Classes started in September of the same year. Since September 2010th at the Academy, in addition to the CISCO courses started Linux and specialized courses and academy gets new name-ICT Academy. Since September 2011th at the Academy for the first time began education in the field of programming over two courses Java programming language. Academy so far attended more than 500 attendees with the percentage of success more than 90%.

Key staff

- Prof. Dr. Slavko Maric
- Prof. Dr. Zoran Djuric
- Rade Djurasinovic
- Slobodan Blatnjak
- Mladen Maric
- Vladimir Perisic
- Zlatko Dejanovic
- Ognjen Joldžić
- Dijana Vukovic

Commercial Services

- ICT Academy offers seven courses for the following programs:
- CISCO CCNA Exploration (4 semesters, totaling 280 hours)
 - CISCO CCNP (three semesters, totaling 210 hours)
 - CISCO CCNA Security (one semester, 70 hours)
 - Linux + Professional Course - Basic Course (two semesters, totaling 140 hours)
 - Linux + Professional Course - Advanced Course (two semesters, totaling 140 hours)
 - Fundamentals of the Java programming language and OO analysis and design -

Entrepreneurial / specialized training

Specialized training through ICT Academy in the field of programming (Java) and administration software based systems (Linux).

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Objectives and activities

- Classes
- Research

Results

- Control methods for induction motors in the regime of weak field;
- Methods of managing user distributed generation;
- Algorithms spacing protection of power lines.

Key staff

- Petar Matić
- Čedomir Zeljković
- Siniša Zubić

The most important projects

- Projects of the Ministry of Science and Technology of the Government of the Republika Srpska
- Renewable Energy Sources in the Republika Srpska - USE OF WIND ENERGY
 - Improving the Energy Efficiency of most consumers in the Republic of Srpska

The most important equipment and software

- The unit for measuring power quality parameters, Metrel Power Q4;
- Development environment TMD51MTRPFCKIT Texas Instruments;
- Laboratory Microgrid

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Objectives and activities

The main objectives and activities related to research, design and practical implementation of various types of electronic circuits, devices and systems, designed for a variety of applications. Emphasis is on research and design of digital electronic circuits and systems, embedded systems, microprocessor and microcontroller based systems specialized purposes. Significant activities are focused on the research and application of CMOS technology and circuits, digital circuits and systems with multiple logical levels, programmable logic structures, wireless sensor networks, LED lighting technology and information, methods and procedures to reduce energy consumption, industrial networks, renewable power, energy and industrial electronics, biomedical devices and systems. Studies are being realized in the field of analog electronic circuits and systems, and microelectronic technology and nanoelektronskih.

Results

The results of past activities include :

- Hundreds of scientific papers published in international and national journals and at such conferences
- Dozens of projects implemented for the needs of different institutions and enterprises
- A number of new products,
- Increasing number of new and original solutions of electronic circuits and systems, methods and procedures for the design, analysis, synthesis and optimization of electronic technologies, and car systems.

Key staff

Prof. Dr. Zlatko Bundalo
Prof. Dr Branko Dokic
Prof. Dr. Ferid Softic
Prof. Dr. Tatjana Pesic – Brđanin
Prof. Dr. Branko Blanuša

The most important projects

- Development and implementation of techniques for reducing consumption in programming languages for hardware design, 2012-2014
- Technology development and testing of photovoltaic solar systems with an increased level of efficiency, 2011-212
- Improving power efficiency at typical types of consumers in the Republia Srpska, 2011-2012
- Application of wireless communication technologies in medical devices, 2011
- Research, design and implementation of microprocessor-based systems to improve energy efficiency in intelligent buildings, 2010-2011
- Development and implementation of microprocessor-based systems LED lighting and LED systems for signaling and Information, 2010-2011
- Design and implementation of microprocessor systems for automatic measurement, sensing and control of electric meters, 2009-2010
- Synthesis and optimization of digital electronic circuits and systems in which it uses multiple logical states, 2009-2010
- Design of individual electronic systems for improving hearing, 2009
- Implementation and testing of the EtherCAT system, 2009

The most important prototypes / products / services

- Electronic devices and microprocessor-based devices for different purposes.
- New methods and procedures, for the design, analysis, synthesis and optimization of electronic technologies and systems.
- Specialist training in the field of designing different types of electronic circuits, devices and systems, digital electronic circuits and systems, embedded systems, microprocessor and microcontroller based systems, CMOS technology and circuits, programmable logic structures, industrial networks, renewable energy, power and industrial systems.

The most important equipment and software

- Development environment PandaBoard
- Development environment Altera DE2 - 115
- Development environment Altera DE1
- The software development environment Altera Quartus II
- Development environment EasyARM
- Development environment EasyAVR6
- Development environment Easy8051A
- The software development environment mikroC
- Development environment Beckhoff EL9821 Evaluation Kit
- Beckhoff TwinCAT software package

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Laboratory of General Electrical Engineering Faculty of Electrical Engineering



Objectives and activities

Education

- Research and development in the field of general electrical
- Publication of research results in reputable journals and conferences
- Establishing cooperation with other academic communities and the economy.
- Research in the field of application of RFID technology,
- Development and implementation of algorithms on different platforms such as PC, GPU, DSP and FPGA
- Application software and IT solutions in measurement systems.

Results

- New applications of RFID technology;
- Development of materials for eLearning in the fields of activity of the Department.

Key staff

- Prof. Dr. Zdenka Babic
- Mr. Milorad Bajic
- Dr. Vladimir Risojević
- Aleksej Avramovic
- Slavica Savic

The most important equipment and software

- Developing systems for DSP Analog Devices ADZS - 21489 - EZLITE Evaluation Kit
<http://www.analog.com/en/evaluation/21489-ezlite/eb.html>
- Developing systems for Texas Instruments DSP LDK 5510 <http://c5000.spectrumdigital.com/dsk5510/>
- FPGA development system
- Developing a system for RFID,
- Developing a system for Texas Instruments OMAP,
- Thermal Imaging Camera,
- Spectrum Analyzer,
- Network Analyzer

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Laboratory for Computer Networks Faculty of Electrical Engineering



Objectives and activities

Design and implementation of computer networks of different network technologies, architectures and different communication protocols.

Results

Within laboratories realized several projects in the field of computer networks, and have been published several scientific papers in this field. Members laboratorije participated and led significant and complex projects or segments of projects implemented within other institutions.

Key staff

- Prof. Dr.Slavko Marić
- Prof. Dr.Ratko Dejanović
- Dr. Dražen Brđanin
- Mr. Mihajlo Savić
- Ognjen Joldzić
- Dijana Vuković
- Goran Banjac

The most important projects

- Preliminary design of the networking of the local office of the City Administration with a central system, the City Administration of Banja Luka, Banja Luka,
- SITAP, standards and recommendations for the use of information - communication technologies, the Ministry of Health and Social Protection of the Republika Srpska
- Ministry of Health and the Federation of Bosnia and Herzegovina,
- Strategic Development Plan for Information Systems, University of Banja Luka.

Commercial Services

Design and implementation of computer networks

Entrepreneurial / specialized training:

Specialist training through ICT Academy in the field of programming (Java) and administration software based systems (Linux).

Contact

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Software Systems Laboratory Fakulty of Electrical Engineering



Objectives and activities

- Planning the development of computer -based systems
 - Modeling and analysis system,
 - Specification of system and software requirements
 - Design, development, verification, implementation and maintenance of software systems
- Specifically, the focus of activities as applying RAD tools and techniques, agile software development methodologies, model driven software development, current programming techniques and programming paradigms, modern software architecture and concepts (Web and service - oriented technologies, cloud computing, Virtualization, Security, etc.).

Results

Within laboratories realized several projects in the field of software and computer-based systems, distribuiranih systems and grid computing for institutions, research projects and the economy. Also, the publications were published several scientific papers in the field of model-driven software development, security, business information systems, web applications and systems, etc. Members of laboratories participated and led significant and complex projects or segments of projects implemented in the framework of other institutions, such as: Politics and Strategy of Information Society of Bosnia and Herzegovina, modeling and analysis of system and software requirements specification for a system for the identification, passport and other documents at the state level, etc.

Key staff

- Prof. Dr.Slavko Marić
- Prof. Dr.Zoran Đurić
- Dr. Dražen Brđanin
- Mr.Mihajlo Savić
- Ognjen Joldžić
- Dijana Vuković
- Goran Banjac

The most important projects

- FP7 HPSEE, High - Performance Computing Infrastructure for South East Europe 's Research Communities
- FP6 SEEGRID,
- TEMPUS JEP 16110-2001, Reconstruction of study of informatics on BH Universities,
- Privacy of Information Society of BiH
- Strategy of Information Society of BiH
- CIPS system for identification documents - participation in the project (the specification for the system)
- Design, the development of applications, implementation, maintenance Web site of the city of Banja Luka,
- The pilot project for the introduction of PKI in ADMINISTRATIVE service of Banja Luka (ASBL)
- Internet services ADMINISTRATIVE service of Banja Luka (ASBL)
- Business modeling system for issuing visas
- Design requirements for an integrated information system of city administration in Banja Luka
- The information system of the Ministry for Veterans, victims of war and labor
- A system to support keeping the shareholding Assembly of Serbian Telekom
- Information system companies Krajinalijek: design, development and implementation
- Information system companies Banja Luka Brewery: design, development and implementation
- Information system companies Vetprom: design, development and implementation,
- Information system companies Jelšingrad - Steel Foundry Banja Luka.

Prototypes / products / services

- Privacy of Information Society of BiH
- Strategy of Information Society of BiH
- Implementation of grid nodes within SEEGRID infrastructure,
- Specification of the CIPS system for identification documents,
- Web site of the city of Banja Luka,
- PKI infrastructure ADMINISTRATIVE service of Banja Luka (ASBL)
- Internet services ADMINISTRATIVE service of Banja Luka (ASBL)
- Design requirements for an integrated information system of city administration in Banja Luka,
- The information system of the Ministry for Veterans, victims of war and labor,
- A system to support keeping the shareholding Assembly of Serbian Telekom,
- Information system Krajinalijek companies.

Commercial Services

- Business Information Systems,
- Design, develop, implement domain-specific information systems,
- Database Tuning
- Web programming and development,
- Modeling software systems,
- Training in the areas of programming, databases, information systems

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Safety computer systems Laboratory Faculty of Electrical Engineering



Objectives and activities

- Design, development and implementation of solutions in the domain of computer security,
- Testing the security of computer systems, primarily applications, computer networks and services,
- Designing security protocols and verification of security requirements

Results

Within laboratories realized several projects in the field of computer systems security, and have been published several scientific papers in this scientific field.

Key staff

- Prof. Dr. Slavko Maric
- Prof. Dr. Zoran Djuric
- Ognjen Joldžić
- Dijana Vukovic

The most important projects

- Analysis of the safety aspects of home banking system, for Zepter Bank of Commerce, Banja Luka, January 2005
- SITAP, standards and recommendations for the use of information - communication technologies, the Ministry of Health and Social Protection of the Republic of Srpska
- Ministry of Health and the Federation of Bosnia and Herzegovina, 2006
- Strategic Development Plan for Information Systems, University of Banja Luka, December 2007,
- The pilot project for the introduction of PKI in the administrative services of the city of Banja, for administrative services of the city of Banja Luka, November 2009 - January 2010
- Training "Web services, security, Web applications and Web services, PKI," the Civil Service Agency, May - June 2010

Commercial Services

- Design, development and implementation of solutions based on PKI infrastructure
- Design, development and implementation of security solutions for web and other applications,
- penetration testing,
- Static analysis of source code,
- Education in the computer system security

Entrepreneurial / specialized training

Specialist training through ICT Academy in the field of programming (Java) and administration software based systems (Linux).

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Sports Institute Faculty of physical education and sport



Objectives and activities

- Research in the area of human responses to physical activity and its adaptation.
- Improving the scientific research on FFVIS and other colleges that indicate the need for research in the field of sports physiology
- Improve scientific support college sports practice (sports clubs, fitness centers, schools, etc)
- The competitiveness of our research papers in reference to international and domestic publications
- The exchange of information between universities and other institutions (medical institutions, various government institutions)
- Raising the quality of the teaching process at the Faculty of Physical Education and Sport

The most important equipment and software

- DIGITAL spirometer MICRO LAB ML 3500
- ERGO TESTER
- TIMER ERGO PLUS
- Analyzer TANITA BC body composition analyzer BC 418 MA III
- POLAR counter Hearth pulsemeter With 625 X
- PHOTO CELSS KIT
- ERGOBICIKL MONARK 928 PRO VO2
- NOVEL PLATFORM AT ¾
- LACTATE analyzer ACCUTREND PLUS
- BOSO MEDISTAR S (digital pressure gauge)
- FITM MED (ERGOSPIROMETAR with mask)

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Objectives and activities

- To establish links between universities and companies through the development of new models of cooperation modeled on the proven success of the EU model,
- Provide services for the improvement of existing and development of new innovative products, processes and tools for enterprises, small and medium enterprises,
- Provide high-quality and versatile research result, which will run regular funding and implementation of innovation in enterprises,
- Develop new and modernize existing vocational training programs to the needs of enterprises and labor markets,
- Play an active role in spreading the WBC Vmnet network,
- To enable students to gain practical knowledge and skills in the industry,
- Create opportunities for involvement in a number of international projects.

Results

- Participation in Tempus project: network user virtual production of the Western Balkans-support the integration of the knowledge triangle
- Realized specialist training
- Development and implementation of industrial Scholarship Program (IFP),
- Development and implementation of the Program student practices (PPP)
- Realized industrial practices in companies of Serbian, Croatian, Slovenian and Serbian
- Development of graduate theses
- Simulation of the process technology of plasticity
- Measurement and analysis of the level of noise and vibration
- Analysis of the performance of high speed rotating machinery

Key staff

- Prof. Dr. Zivko Babic
- Prof. Dr. Gordana Lakic Globočki
- Prof. Dr. Valentin Golubovic-Bugarski
- Mr. Branislav Sredanović
- Mr. Stevo Borojević
- Tihomir Mačkić

The most important projects

TEMPUS project: network user virtual production of the Western Balkans - support the integration of the knowledge triangle ("WBC Virtual Manufacturing Network and Fostering an Integration of the Knowledge Triangle"), 2009-2012.

The most important equipment and software

Equipment:

- Triaxial machining center EMCO MILL 450
- NC classrooms with 5 simulator with three control units: EMCO Win Sinumerik 810/840D, EMCO Win NC Heidenhain TNC 426/430, EMCO Win Fanuc NC 21
- Professional CNC tool milling machine type WF 5/800 control unit Heidenhain
- Educational lathe EMCO PC TURN 55 with a control unit Sinumeric 840D and the accompanying software WinNC
- Measuring range Kistler 9257B
- Programming system Tecnomatix Plant Simulation
- Versatile 4 -channel analyzer Portable PULSE type 3560 C, Bruel & Kjaer manufacturer software Pulse LabShop version 9
- DeltaTron ® accelerometers type 4506, 4507 and 4508
- Human Vibration Analyzer Type 4447, Bruel & Kjaer manufacturer

Software :

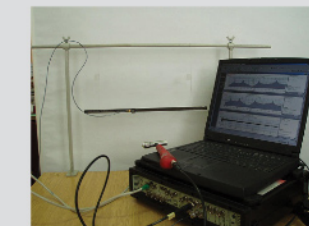
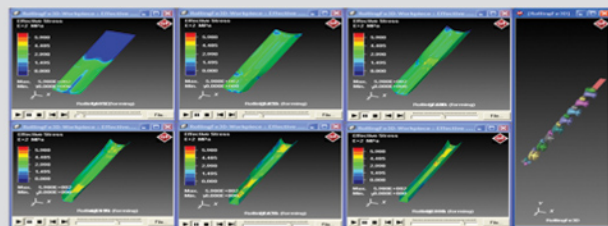
- Simufact.forming
- CATIA,
- Solid Works,
- Math CAD

Commercial Services

- product development,
- optimization of technological processes
- measurement of noise and vibration
- Specialist training: Advanced CAD modeling, NC programming and the basics of CAM modeling, Fundamentals of noise, vibration, and vibration on the human body

Kontakt

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Laboratory of Intelligent Systems Faculty of Mechanical Engineering



Objectives and activities

Laboratory of Intelligent Systems (LIS), was created at the Faculty of Mechanical Engineering to facilitate the development of interdisciplinary subjects and provide additional opportunities for collaboration and research. LIS allows students of the Faculty to investigate, design and implement the coupling algorithm controls using non - traditional techniques derived from different disciplines of artificial intelligence, such as fuzzy logic, neural networks, genetic algorithms, hybrid approaches, etc. LIS is also equipped with opportunities to work with experts from other disciplines. Such joint work gives students experience working on a joint project. Robots and other equipment procured for the LIS is used to support teaching to students through new programs in the field of intelligent systems design and applications, intelligent control, autonomous robots, and more. Robot in the primary, secondary and advanced level is used to facilitate research, training and integrated research / educational activities at different levels of academic disciplines.

LIS is fully funded 2008-2009 by the Ministry of Science and Technology through projects Fuzzy systems and Robi001 and continued with the project of finance over HERD.

Results

- Through the project "Development of artificial intelligence, fuzzy logic in production systems", the acquisition of robot ABB IRB 2000
- Through the project "Robotics as a basis for economic development for small and medium enterprises through workshops," purchase of software for offline robot control over the older generation company PPM and work with him
- Joining the project BANOROB, based on the results of the previous laboratories.

Key staff

Prof. Dr. Latinović Tihomir

The most important projects

- "Development of artificial intelligence, fuzzy logic in production systems", the date of 30.12.2008, No. 06/6-030/3-239-1/08. project finished 2009th, accepted by the Ministry of Science and Technology of the Republika Srpska
- "Robotics as a basis for economic development for small and medium enterprises through workshops," date 31.12.2009, 19/6-020/961-128/09, the project is in progress. Accepted by the Ministry of Science and Technology of the Republic of Srpska
- CEEPUS since 2001
- BANOROB within HERD ICT Project

The most important equipment and software

Robot ABB IRB 2000 with associated equipment
SPOT S3 for the offline programming of robots ABB robot and a number of the older generation

Commercial Services

- Training for Visual Basic, C + +, 2 and 3D ACAD, Solid Works, and CATIA software
- Basic courses for Programming Robots

Contact

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Institute of Agricultural Economics and Rural Development Agricultural Faculty



Objectives and activities

Scientific and research activities: research in the areas of agricultural policy, rural development, competitiveness of agricultural production and other fields, made by the Institute of Agricultural Economics and Rural Development recognizable to the general public, and resulted in the publication of significant strategic programs, books, monographs, professional and scientific works. Project activities: The Institute has implemented over 20 projects supported by the Ministry of Science and Technology, Ministry of Agriculture, Forestry and Water Management of Republic of agencies and other research institutes at home and abroad with which the Institute has a partnership cooperation. Service activities : Institute of Agricultural Economics has implemented significant projects and programs for the Ministry of Agriculture, Forestry and Water Management of the Republika Srpska and one of the permanent partner of the ministry in the creation of the current agricultural policy and rural development policy.

Results

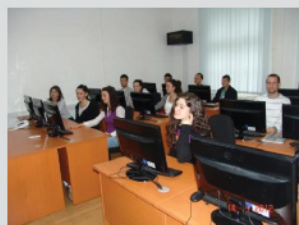
Among the most significant results of the implementation of projects allocated Western Balkan Rural Extension Network through Curriculum Reform, 2009-2012, TEMPUS program; IPARD Preparation of sector analysis in BiH, 2011-2012, FAO Development Programme agricultural cooperatives in the Serbian Republic, 2011, RS MoA; strategic Plan for Rural Development of the Republika Srpska, 2009, RS MoA; determine the level of economic efficiency of agricultural production in the Republika Srpska; opine RS; analysis of socio - economic indicators of development in rural areas of the Republika Srpska, 2008-2009, opine RS; economic evaluation of organizational and technological solutions production and trade of agricultural products in 2008, opine RS; introduction of a new model of subsidies, protection and agricultural financing RS 2007, RS MoA.

Key staff

Prof. Dr. Stevo Mirjanić
Prof. Dr. Željko Vaško
Prof. Dr. Aleksandar Ostojic
Prof. Dr. Gordana Rokvić
Prof. Dr. Ljiljana Drinic

The most important projects

The Western Balkan Rural Extension Network through Curriculum Reform, EC TEMPUS project 158,177, 2010-2012
The program of rural development of Srbac Municipality, Faculty of Agriculture Banja Luka, 2010
The Republika Srpska rural Strategic Development Plan for the period 2009-15, Faculty of Agriculture Banja Luka for the RS Ministry of Agriculture, Forestry and Water Management, 2009
Determining level of economic efficiency of agricultural production in the Republika Srpska, Ministry of Science of the Republika Srpska, 2009
The Republika Srpska antihail defense strategy, the RS Ministry of Agriculture, Forestry and Water Management, Banja Luka, 2009
Analyses of socio - economic indicators of development rural areas of the Republic of Serbian, RS Ministry of Agriculture, Forestry and Water Management, 2008-2009



The most important prototypes / products / services

Preparation of studies in different areas of agricultural production and rural development.
Development of strategic documents in agriculture and rural development.
Analysis of policy and program development of agriculture and rural areas in Bosnia and Herzegovina.
Making development programs of commercial farms.
Providing consulting services in agriculture and rural development.
Analysis of the situation of rural areas.
Socio - Economic Research.

The most important equipment and software

Institute of Agricultural Economics coordinate the work of a computer cabinet and the Advisory Centre for Rural Development at the Faculty of Agriculture, which are intended for teaching and student work outside of teaching time.
- Within the computer cabinet is 24 computers.
- The composition of the Advisory Centre for Rural Development of 16 computers.
- The Institute provides software for statistical data.

Contact

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Field Crops Institute Faculty of Agriculture



Objectives and activities

- basic, developmental and applied scientific research in the field of farming.
- transmission of the results of scientific research in the teaching and learning processes.
- promote and develop educational and scientific relations and cooperation at home and abroad.
- encourage and negotiates scientific research and educational student cooperation.
- proposes, in order to participate and strategic projects in the field of crop production.
- preparation of development projects of small and medium enterprises and audit projects and studies in farming.
- encourages international cooperation and membership in international institutions and associations
- improving service activities, such as quality control of seeds and seedlings.
- encourages and promotes publishing.
- organize a public presentation of scientific papers, studies and projects development.

Results

Research program for laboratories Ecophysiology includes morphological, physiological and cyto - histological aspects of the relationship of environmental factors and the process of organogenesis in the development of plants in different growth conditions. Studies are of special importance and include the study of physiological factors of resistance to low temperature and drought. Testing laboratories program includes biotech seed health testing and the use value of seeds as well as research in the area of seed and plant breeding field crops, forage, vegetables, medicinal and aromatic plants. The experimental polygon is the basic unit for teaching and scientific work of students of first and second cycle studies. On the experimental polygon students master basic and special skills and perform practical research for the final master work.

Key staff

- Prof. Dr. Mile Dardić
- Prof. Dr. Ilija Komljenović
- Prof. Dr. Danijela Kondić
- Mr. Vojo Radic
- Mr. Branko Djuric

The most important projects

- Research, education and knowledge transfer promoting entrepreneurship in sustainable use of pastureland/grazing. NORAGRIC -HERD. (2011-2014)
- Sustainable preservation of indigenous South East European legumes and their traditional food and feed products, SEELEGUMES, SEERA. (2010-2012)
- SEE-ERA.NET PLUS: Preservation of indigenous species and traditional food products. Sustainable preservation of indigenous South Eastern European legumes and their traditional food and feed products. WP3. Molecular and conventional characterization of indigenous SEE legumes, with a description of the most important traits by both genomic tools and morphological markers. (2010-2011)
- Exploring, collecting and characterizing the local forms of industrial crops from SEEDNet area. 2009-2010. South East European Development Network on plant genetic resources - SEEDNet.
- Collection, characterization and regeneration of local kale (*Brassica oleracea* var. *acephala*) population germplasm from eastern Adriatic coast region for their conservation in gene banks. (2007-2010)
- Zalivni režim salate u zaštićenom prostoru. Ministarstvo nauke i tehnologije Republike Srpske. (2009-2010)
- For NATO/PPF Trust Fund (NTF) Programme for Assistance to redundant Military Personnel in Bosnia and Herzegovina (2009).
- Inventorying, collecting and providing of access to flax and hemp genetic resources in the region of Southeast Europe. 2007-2008. South East European Development Network on plant genetic resources - SEEDNet.



The most important prototypes / products / services

- Control of production (public authority) of seed and planting material as agricultural, the vegetable, fodder, industrial, medicinal and aromatic plants.
- Control Services Biotechnology seed quality (purity, germination energy, germination...)
- field crops, the vegetable, fodder, industrial, medicinal and aromatic plants.
- Services for design, consulting, marketing and engineering activities in the field of activity of the Institute.
- Laboratory services to third parties in the field sjemenarsva and ecophysiology.
- Specialized training in advanced techniques of grafting vegetables.

The most important equipment and software

Laboratory techniques in research laboratories for Ecophysiology are based on the equipment to measure the rate of photosynthesis and respiration, equipment for histology (microtome for cutting the ice), binocular loupe and light microscope with software for digital image analysis. Fitotron with process equipment to simulate the given environmental parameters in the process of procurement. Modern equipment for laboratory examination of the seeds to complete, individual and independent analysis of quality seeds. Activity laboratories include: examination of quantitative and qualitative traits of seeds, seed physiology testing. The experimental range is equipped with basic equipment: covered with clear/n uva film thickness of 200 microns, anticondensative, with a system of irrigation by drop-by-drop, a system for tying plants, shading systems and ventilation systems.

Kontakt

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Institute of Agroecology and Land Faculty of Agriculture



Objectives and activities

Scientific research is conducted through the basic, applied and developmental research in the fields of agroecology, the science of soil, land reclamation, erosion and conservation of soil, cropping system, application of mechanization in agriculture, study quality fertilizers, soil conditioners and water for irrigation, and research in the field of environmental protection: protection of biodiversity, soil, water, arable and vegetable crops and wetland agroecosystems.

Results

Implementation and coordination of international and domestic projects staff of the Institute has contributed to technology, and innovation and the overall socio - economic development.

Significant Projects and Research Institute on topics and areas:

- extreme hydrologic events - floods and droughts,
- determine the measures to increase the efficiency of irrigation and drainage,
- multidisciplinary approach to water resources management,
- application of GIS in developing dedicated cards,
- the protection, use and regulation of agricultural land,
- development of new technological processes reclamation,

Key staff

Prof. Dr.Zlatan Kovacevic
Prof. Dr.Mihajlo Markovic
Prof. Dr.Vaso Bojanic
Prof. Dr.Borislav Raičić
Dr.Sinisa Mitrić

The most important projects

- FP6 : "Reintegration of coal ash disposal sites and mitigation of pollution in the West Balkan area" No. INCO - WBC 1-509173 (RECOAL).
- FP6: "Sava River Basin : Sustainable Use, Management and Protection of Resources" But INCO - CT - 2004-509160 (SARIB).
- "Improving nutritional quality and safety of food and fodder crops in South Eastern Europe (SEE) countries."Norwegian Programme" Institutional collaboration between academic institutions in Agriculture, Forestry and Veterinary Medicine in Norway and Bosnia & Herzegovina, Croatia and Serbia & Montenegro.
- "Noragric is the Department of International Environment and Development Studies at the Norwegian University of Life Sciences - UMB.
- Ramsar SGF Project: "Restoration and rehabilitation Wetland Region Bardaca, Bosnia and Herzegovina"
- SARIB - Sava River Basin: Sustainable Use, Management and Protection of Resources, INCO - WBC - 1 -no: DE 509 160, 2004-2007 and RECOAL - Reintegration of Coal Ash Disposal Sites and Mitigation of Pollution in the West Balkans Area, INCO - WBC - 1- 509173, 2005-2008.
- TEMPUS programs and projects approved by the UN - the Ramsar conventions by which the region Bardacha declared a wetland of international importance.

The most important prototypes / products / services

The Institute carries out service activities in the field of basic and supplementary chemical and physical analysis of land, project development and study of land reclamation, testing accuracy of machines for the application of pesticides, as well as an analysis of the water.

The most important equipment and software

- HPLC - liquid chromatograph mass,
- Kjeldahl digestion unit,
- sprektrofotometar,
- plamenfotometar,
- stereomicroscope with integrated camera and microscope,
- pH-meters,
- conductometers,
- Equipment for biological testing of pesticides,
- Equipment for field soil tests - probes, cylinders, etc.

Contact

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Institute of Animal Husbandry Faculty of Agriculture



Objectives and activities

- Basic, development and applied research in the field of animal husbandry
- transfer of scientific and professional knowledge in these areas in practice;
- issuing certificates in the field of animal husbandry and design in this area;
- publishing;
- consulting, marketing, engineering,
- preparation and review of projects and studies;
- production and trade of animal products.

Laboratory for quality control of animal feed

Laboratory is capable of testing the chemical composition and nutritive value of feedstuffs and finished and composition. All analyzes of feed are being classical chemical analysis (Weende method) - A decision on fulfillment of the conditions for the work of the Ministry of Agriculture, Forestry and Water Management, 09 - 335-20361/10 from 25.11.2010. year. In addition to the chemical analysis of animal feed, in laboratories for quality control of feed to perform exercises in the field of animal nutrition and production and processing of milk for students of first and second cycle study program, Animal Production Faculty of Agriculture. In addition, the laboratory has done or is doing a significant portion of the test as part of graduation theses, master's theses and doctoral dissertations on Agriculture and other faculties of the University of Banja Luka, as well as a growing number of scientific research projects funded by the Government of the Republika Srpska and international scientific institutions.

Laboratory of genetics and reproduction of domestic animals

The laboratory is equipped with modern equipment for testing the quality of native seeds and insemination doses domestic animals. Quality control of seeds is in line with current laboratory methods with the use of specialized software NIS Elements, and includes macroscopic, microscopic and physico-chemical examination. The students of first and second cycle studies in laboratories perform practical work and research to create the final master work.

Laboratory of Aquaculture

In laboratory tests are carried out aquaculture impact on the growth characteristics of food, feed conversion, digestibility, resilience, health and genetic potential of farmed fish species. Laboratory is used for scientific research (realization of experiments), training and development of graduate students, master's and doctoral theses, and for providing services to manufacturers and producers of fish feed for fish. Images 1983, 1984, 1989 (Laboratory of Aquaculture).

Key staff

Prof. Dr. Dragan Matarugić
Prof. Dr. Dragan Mikavica
Prof. Dr. Stoja Jotanovic
Prof. Dr. Milanka Drinic
Prof. Dr. Bozo Vazic
Prof. Dr. Nebojsa Savic
Prof. Dr. Djordje Savic
Dr. Biljana Rogic
Dr. Goran Mirjanić
Mr. Marinko Vekić
Mr. Aleksandar Kralj



The most important projects

- "Evaluation of cattle welfare and housing in Bosnia and Herzegovina and establishing a research/ extension group in animal housing, welfare and behaviour" Project finance by Norwegian Government (2012-2015)
- "Comparison of lamb carcass and meat quality of breeds in Western Balkans and Norway achieving improved palatability, sale and sustainability (ACRONYM: LAMBCAMEQU)" Project finance by Norwegian Government (2011-2014)
- Promotion of sustainable growing rainbow trout (*Oncorhynchus mykiss*, Wal.) (2010-2012) - Ministry of Agriculture, Forestry and Water Management of the Republic of Srpska
- Genetic distance between autochthonous Busha and Gatacko Govece, Faculty of Agriculture Banja Luka for RS Ministry of Agriculture, Forestry and Water Management (2011)
- Influence of body mass, age and ovarian activity in gilts on fertility parameters in the next cycle. Ministry of Science and Technology of the Republic of Srpska, 2009-2010
- The role of the thyroid gland in the pathogenesis of fatty liver in high-milk yield breed heifers, Ministry of Science and Technology of the Republic of Srpska, 2009-2010
- Effects of different warming period on the preservation of broiler breeder egg hatchability. Ministry of Science and Technology of the Republika Srpska, 2008-2009
- Influence of different selenium sources on the feed efficiency, growth and its content in broiler meat, 2008-2009
- Standardization of technology and chemical, physical and microbiological quality characteristics of autochthonous white pickled (Travnicki) and hard (Livanjski) cheese in Bosnia and Herzegovina, Project finance by Norwegian Government (2009)
- Reorientation of Academic Education in Agriculture in SE Europe - Curriculum Development in Animal Breeding and Animal Husbandry, Project finance by Norwegian Government (2009)
- Sustainable selection program for salmonid strains of the river Neretva (2005-2009) - Department of International Environment and Development Studies, NORAGRIC, Norwegian University of Life Sciences (UMB).
- Novel and local feed components for rainbow trout (2005-2009) - Department of International Environment and Development Studies, NORAGRIC, Norwegian University of Life Sciences (UMB).

The most important equipment and software

Laboratory for quality control of feed. Laboratory has all the necessary equipment for chemical composition and nutritive value of feedstuffs and ready composition. All analyzes of feed are made classical chemical analysis.

Laboratory of Genetics and reproduction of domestic animals has the necessary equipment for the preparation of native seeds or insemination doses for macroscopic and microscopic examination (water bath, of heating plates), prepared microscope for examination preparation and computer software NIS Elements by which examines the increasing number of sperm quality parameters.

Laboratory of Aquaculture is equipped with 12 flow aquarium volume per 55 l / aquarium; system Valve constant flow of fresh (borehole) water in aquariums; 3 thin volume of 1000 liters / tank, air compressors for oxygen content (Atman); digital devices for sensing water temperature, dissolved oxygen content and oxygen saturation of water (Oximeter Oxi 330i/SET 2B20 - 0011 WTW), and water pH (pH 330i/SET 2A20 - 1011 WTW), scales, etc.

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Institute of Horticulture Faculty of Agriculture



Objectives and activities

Basic, development and applied scientific research in the field of horticulture (horticulture, viticulture, truck farming, floriculture and ornamental plants, medicinal and aromatic herbs), protection of horticultural plants and biotechnology of horticultural plants. The Institute is engaged in the development and review of projects and studies, as well as the transfer of scientific and technical results in practice. One of the Institute's activities and the issuance of scientific publications in the field of horticulture. These educational - scientific and service activities were carried out in six laboratories and two polygons.

Results

The main results of the Institute are:

- Analysis of cyto - genetic and cyto - histological aspects of embryology in the formulation and implementation of gender potentials of agricultural plants;
- Characterization of the virus using methods (PCR - RFLP, DASI ELISA, electrophoresis-adsorption - immunoenzyme analysis);
- Detection of phytoplasma double polymerase chain reaction;
- Research on fitoparazitnim nematodes;
- Analysis of morphological, physiological and biotechnological characteristics of the fruit of agricultural plants, in terms of their varietal (genotype) and the economic characterization of biological standardization as well as studying the viability of the fruit after harvest and during storage to immediate use.
- The introduction of plants in vitro culture and reproduction (multiplication, passaging), as well as the determination method of micropropagation of new genotypes with adaptation of plant material produced in vitro culture.

Key staff

Prof. dr Nikola Micic
Prof. dr Gordan Djuric
Prof. dr Miljan Cvetkovic
Dr Tatjana Jovanovic - Cvetkovic
Dr Svetlana Zeljković
Dr Ljubomir Rados
Dr Boris Pasalic
Dr Duska Delic

The most important projects

- COST Action FA 0807: Integrated Management of Phytoplasma Epidemics in Different Crop Systems. From 2008-2013. MC Member of Action.
- FP 7 : FOCUS -BALKANS, Food Consumer Science in the Balkans. Frameworks, Protocols and Networks for a better knowledge of food behaviors (2008-2011).
- Anatomical morphological and cyto - histological evaluation of the reproductive organs of indigenous grape varieties, BiH Ministry of Science and Technology of the Republic of Srpska (2008-2009)
- Studying the constitution of the female gametophyte pears as a basis for inducing partenokarpnih fruits, Ministry of Science and Technology of the Republika Srpska (2008- 2009)
- Application biostimulators in growing flowers for the purpose of environmental protection, the Ministry of Science and Technology of the Republic of Srpska (2008-2009)
- System control phytoplasma in different crops, Ministry of Agriculture, Forestry and Water Management of the Republika Srpska, (2010-2011)
- The program of special surveillance presence krompirovih nematode Globodera rostochiensis and Globodera pallida, Ministry of Agriculture, Forestry and Water Management of the Republic of Srpska (2010-2013)
- The study of the anatomical and physiological properties of the epidermis and subepidermisa epidermis tissue of apple fruit, the Ministry of Science and Technology of the Republic of Srpska (2011-2013)
- Genotypic specificity of root growth and development of different apple rootstocks in terms pseudogley land, the Ministry of Science and Technology Rebulike Serbian (2012 -2014)
- 10th COST Action FA 1104 : Sustainable production of high-quality cherries for the European market (2013-2017).



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The most important prototypes / products / services

Service Industry, under the authority granted by the Ministry of Agriculture, Forestry and Water Management of the Republika Srpska and BiH Directorate for Plant Protection, under which it is performed : control over the production of seeds and planting material of horticultural plants, control of compulsory medical examination of agricultural crops and facilities, seeds and planting material of agricultural plants; health monitoring seedlings and planting material imported with the end user (postkarantinski supervision) laboratory testing of the health status of consignments in transport and diagnostic and laboratory tests of samples of plants. Consulting services in the field of design production in the field of horticulture, as well as educational and professional advisory services for manufacturers.

The most important equipment and software

Equipment for making permanent histological preparations - microtome, microscopic magnifying glass, luminous microscope, inverted light microscopy and fluorescence microscopy;
Equipment for certification of planting material and seedlings of horticultural plants - autoclave and other associated equipment for the preparation and storage of surface and solution, laminar flow cabinets and shelves with controlled conditions of temperature and light for unrestricted growth and development of plants, a greenhouse with a system for heating, ventilation and shading, roll-up - tables and other accompanying equipment, insect proof screenhouse, extractors for extracting free-living and cyst nematodes, binocular for morphological detection of nematodes;
Equipment pomologist and Biotechnology in Horticulture - spectrophotometer, analytical scales, digital scales, refractometers and penetrometers, colorimeter and measuring devices in refrigerated storage conditions, an experimental refrigeration equipment for the isolation, purification and quantification of total genomic DNA, restriction endonuclease digestion of DNA, cyclic reaction (PCR) and agarose gel electrophoresis and by gel PAA electrophoresis;
Equipment for the analysis of wines and alcoholic drinks - testing quality parameters of grapes and wine, the determination of physical and chemical components of the quality of grapes and wine (Dryer, Furnace, steam bath, ebullioskop, pycnometers).

Contact

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Center for Biodiversity Institute of Genetic Resources



Objectives and activities

- Preserving the diversity of genetic resources for food and agriculture in situ and ex situ conditions,
- Development of the republic gene bank through the classic methods of characterization and the use of molecular techniques for marking,
- Conserving and restoring ecosystems altered due to modern agricultural production through the application of the principles of sustainable development,
- Promoting public work related to the deployment of competences and responsibilities of central government and local authorities, organizations and institutions involved in the conservation and use of genetic resources,
- Promoting relationships that will lead to increased cooperation at the national, transnational and international level,
- Creating a database of genetic resources with all the key details,
- To raise public awareness of the need and importance of preserving genetic resources through improvement of education at all levels, training, and providing support to research and development.
- Research and experimental development on natural sciences and engineering sciences
- Research and experimental development on biotechnology
- Higher Education
- Technical testing and analysis
- Consultancy activities
- Publication of books, periodicals and other publishing activities

Results

Center for Biodiversity is an organizational unit of the Institute of Genetic Resources, University of Banja Luka, and a unit for coordinating the implementation of the Programme of conservation of plant genetic resources of the Republika Srpska and all other activities in the field of conservation of genetic resources. RS with this program governing the conservation and sustainable use of plant genetic resources, now represents a unique example in the environment, when it comes to the legal basis for activities related to genetic resources. This program represents the crown of the results of reconstructed activities on plant genetic resources and provides the basis for scientific research in this field.

As part of the Center for Biodiversity, is Plant Gene Bank of the Republika Srpska. It is located seed collections of grains, vegetables, fodder, industrial and medicinal and aromatic plants, which are currently around 1000 acquisition in the long-term preservation.

In addition to the seed collection, Gene Bank also has two field collections of indigenous fruit trees. One collection is the location of the Botanical Garden of the University of Banja Luka, with 299 trees of 123 indigenous varieties of apples and pears. Another Polish Collection is located in the municipality of Čajniče with 205 seedlings (41 varieties), of which 130 seedlings of apples (26 varieties) and 75 pear seedlings (15 varieties).

Key staff

- Prof. Dr. Gordana Djuric
- Natasha B. Pasalic, senior associate at the Center for Biodiversity.
- Mr Sanda Stanivuković
- Mr Predrag Ilic
- Prof. Dr. Miljan Cvetkovic
- Prof. Dr. Daniel Kondic
- Prof. Dr. Vida Todorovic
- Dr Boris Pasalic
- Mr Marina Radun
- Mr Tatjana Jovanovic - Cvetkovic
- Mr Dragana Pećanac

The most important projects

International Projects

Towards the preservation of autochthonous grapevine (*Vitis vinifera* L.) varieties in WBC (Vitis - WBC), the SEE - ERA.NET Plus (<http://plus.see-era.net/pjc/fundedprojects155.html>)

National projects

(<http://gri.unibl.org/index.php?idsek=44&griunibl=Realizovani/projekti>)

- The conservation of plant genetic resources of the Republika Srpska
- Evaluation and genetic characterization of indigenous types of fruit trees and vines of Serbian
- Genotypic characterization of male sterility varieties Merlot
- Embriologically aspects of genotypic characterization of native potential of triticales
- Biomass as a renewable energy source
- Genotypic characterization of nematode Lijevče fields
- Collection of data on indigenous varieties of grapes (*Vitis vinifera* L.) to support the management of the national collections of vines
- The dynamics of differentiation of female gametophyte pears depending on the position of the flowers in bloom
- Volatile interaction between undamaged plants corn and beans, and its impact on your
- Evaluation and genetic characterization of the gene pula vines in Herzegovina
- Genotypic specificity of fertilization hazel (*Corylus avellana* L.) in the ecological conditions of the Banja Luka region
- Microsporogenesis, mikrogametogeneza and pollen germination of *Castanea sativa* Mill. in association Fago Castanetum and Quercus Castanetum in the region Potkozarje
- Genotypic specificity of biochemical - physiological parameters pear fruits depending on the position and exposure of the fruit on the tree.

The most important equipment and software

Center for Biodiversity is fully equipped for the tasks of conservation of plant genetic resources. In addition to off-road vehicles and GPS devices for business inventory, has a laboratory equipped with cleaning, germination, drying and packing of seed and gene bank for long-term storage of collected species.

Laboratory at the Center for Biodiversity

In vitro laboratory, Laboratory of Microscopy, Laboratory of Biotechnology, Laboratory of Molecular Genetics, Laboratory of sterilization; Laboratory for preparation of seed gene bank; herbarium.

Commercial Services

- The production of seedlings of native varieties of fruit trees and vines
- Consultancy services
- Training for in vitro tissue culture
- Training for long-term storage (seed collection and field)

Contact

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Center for sustainable use Institute of Genetic Resources



Objectives and activities

Center for sustainable use of genetic resources is responsible for activities directed towards technological development, innovation, and regional and global socio-economic sustainable development, as well as the application of scientific and technical results in practice. Institute of Genetic Resources, University of Banja Luka was entered in the register of producers seedlings decision of the Ministry of Agriculture, Forestry and Water Management of 12.03.3-2535/13 of 10.06.2013. thus the Institute for Genetic Resources is entitled to engage in production and trade in the area of production of planting material pome, especially stone-fruit, nut and berry fruit, vines and perennial ornamental plants, as well as reproductive seedlings of these species. Institute of Genetic Resources, University of Banja Luka was entered in the register of producers reproductive seedlings of forest trees Decision of the Ministry of Agriculture, Forestry and Water Management of 12.06-18/12 from 16/07/2013. Decision No. 12.06-180/12 from 07/05/2013, The Institute for Genetic Resources entrust the tasks of recognition of the starting material for the production of reproductive material and technical tasks control production of reproductive material of forest trees.

- The cultivation of perennial crops
- The cultivation of perennial crops
- Growing seedlings and ornamental plants
- Raising animals
- Hunting, trapping wild animals in traps and related service activities
- Silviculture and other similar activities in forestry
- Cutting of trees
- Collecting uncultivated forest fruits and products
- Fishing
- Aquaculture
- Processing and preserving of fruit and vegetables
- Manufacture of beverages
- Wholesale of agricultural raw materials
- Retail sale of agricultural raw materials
- Services Planning and maintenance of green areas

Results

Center for sustainable use of the Institute for Genetic Resources was named Control unit of the protected areas for resource management "University City" University of Banja Luka, which occupies a total area of 28 hectares. The complex is protected in May 2012th (decision of the Minister of Physical Planning, Civil Engineering and Ecology Srpskebroj : 15.04-960-39/11 of 16:05. 2012.) upon the request of the University of Banja Luka, and upon the prior opinion of the Ministry of Agriculture, Forestry and Water Management and the Authority for Geodetic and property Affairs. To control the protected area defined by the Institute of Genetic Resources.

Park complex "University City" along with facilities covering an area of 21 hectares. The complex is assigned to the University of Banja Luka 2004th year. Institute of Genetic Resources is 2010th year, began the realization of the project of rehabilitation of the park and protect the overall complex. The results of this evaluation of the park, it can be concluded that the area of the park is an important collection of tree and shrub species, both from an aesthetic as well as in terms of its importance as an educational area and in terms of biodiversity, and the protection and enhancement of the environment. The park recorded a total of 1503 trees, of which 1 386 trees and 117 shrubs. Of the total number of 819 trees are softwood, hardwood and 684. Altogether 77 species, of which 25 species of conifers and 52 species sawmills. Valuable is rated 212 trees. Particularly significant and valuable trees are natural monuments: leaved ash, red oak, swamp taksodijuma groups, unions and Elm avenue of plane trees, as well as individual specimens of rare or important species such as spruce or Picea Abies grandis.

Appreciating the purpose and value of a complex University City, the goal of establishing protection is the formation of an arboretum, filling in new types to the already planted areas and botanical gardens in the space reserved for it, as well as the provision of adequate measures for the preservation and enhancement of the value of the complex, and establishing guidelines for further development and reconstruction.

Botanical Garden as a collection of different plant species, in addition to the ex-situ conservation and protection of endangered plant species used and the improvement of the general botanical knowledge, and therefore each botanic garden, except for scientific, and has an educational function. Construction and raise the botanical gardens to full function is a long process. All the botanical gardens today have a prestigious status in the ancient world are over 200 years old. The botanical garden of the University of Banja Luka is a new facility, but has already become one of the polygons for teaching students program of study horticulture, as well as students of forestry, biology and architecture.



Contact

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The most important projects

Construction of the Botanical Garden of the University of Banja Luka started on the initiative of the Institute of Pomology, Viticulture and Horticulture, Faculty of Agriculture, Faculty of Forestry and Natural-Science Institute during the 2003rd year. Educational and Scientific Council of the University of Banja Luka gave approval for the location of botanical gardens in the new kapmusu "University City", an area of 5.17 ha, and the conclusion of the Assembly of the City of Banja Luka no. 07-013-515/04 of 17 09th 2004th years, accepted the initiative of the University and approved the start of construction of the Botanical gardens. Originally, the unit designated for coordinating the Institute of Pomology, Viticulture and Horticulture, Faculty of Agriculture, but after the establishment of the Institute for Genetic Resources, the decision of the Board of Directors of the University of Banja Luka, 2009th, the buildings and land to the location of the Botanical Garden, are assigned to use this organizational unit of the University, which thereby became the organizational unit responsible for the continuation of construction. By the 2012th year, on a fully landscaped area of 3.5 ha erected arboretum with 46 forest of native species and varietal collection of indigenous varieties of fruit trees with 18 varieties of apples and 13 varieties of pears, as part of a collection in the framework of the conservation of plant genetic resources of the Republika Srpska. The 2013th were raised varietal collection of indigenous varieties of fruit in the field Botanical gardens. On that occasion, a total of 237 trees were planted indigenous varieties of fruit trees, of which 62 varieties of apples, 43 varieties of pears, six varieties of plums, six varieties of cherries and two varieties of apricots.

Key staff

- Prof. Dr. Gordan Djuric
- Prof. Dr. Milan Mataruga
- Prof. Dr. Zoran Govedar
- Prof. Dr. Goran Trbic
- Prof. Dr. Eric Zivojin
- Prof. Dr. Ljiljana Dosenovic
- Natasa B. Pasalic
- Mr Sanda Stanivuković
- Mr Predrag Ilic
- Sunčica Bodružić
- Jelena Davidovic

The most important projects

International Projects

- "Agricultural Biomass Cross-Border Development of Energy in Posavina (ABCDE Posavina)" -ABCDE Posavina ([p://www.abcde-posavina.org/](http://www.abcde-posavina.org/))

National projects

- (<http://gri.unibl.org/index.php?idsek=44&tema=Realizovani/projekti>)
- The conservation of forest genetic resources of the Republika Srpska
- Genetic diversity and morphological variability pomologically populations of chestnut (Castanea sativa Mill.) In Bosnia and Herzegovina
- Health Assessment dendrofonda park
- Heavy metals in forest soils on ultramafic - vegetation as bioremedijator
- Genetic characterization of spruce (Picea abies Karst) in the Republika Srpska
- Preservation and conservation of protected areas for resource management ' University City' Banja Luka

The most important equipment and software

- Botanical Garden
 - Park Complex " University City"
 - Nursery fruit trees, vines, ornamental plants and forest reproductive material
- <http://gri.unibl.org/>

Commercial Services

- Production of seedlings, fruit trees, vines and ornamental plants and forest reproductive material.
- Construction of recognition of the starting material for the production of reproductive material.
- Professional activities of production control reproductive material of forest trees

4. Addition- Classification of research (FOS 2007)

FOS1 Natural sciences
 FOS101 Mathematics
 FOS 102 Computer and Information Science
 FOS103 Physics
 FOS104 Chemistry
 FOS105 Geology and science in relation to the environment
 FOS106 Biology
 FOS107 Other natural sciences
 FOS2 Engineering and Technology
 FOS201 Building Engineering
 FOS202 Engineering in electrical engineering, electronics and computer science
 FOS203 Mechanical Engineering
 FOS204 Chemical Engineering
 FOS205 Materials Engineering
 FOS206 Medical Engineering
 FOS207 Engineering Environment
 FOS208 Environmental biotechnology
 FOS209 Industrial Biotechnology
 FOS210 Nano Technology
 FOS211 Other Engineering and Technology
 FOS3 Medicine and Health Sciences
 FOS301 Basic Medicine
 FOS302 Clinical Medicine
 FOS303 Health Sciences
 FOS304 Health Biotechnology
 FOS305 Other medical science
 FOS4 Agricultural Sciences
 FOS401 Agriculture, forestry and fishing
 FOS402 science of animal
 FOS403 Animal Health
 FOS404 Agricultural Biotechnology
 FOS405 Other agricultural science
 FOS5 Social Sciences
 FOS501 Psychology
 FOS502 Economy
 FOS503 Educational Science
 FOS504 Sociology
 FOS505 The Law
 FOS506 Political Science
 FOS507 Social and economic geography
 FOS508 Media and Communications
 FOS509 Other Social Sciences
 FOS6 Social Science
 FOS601 History and Archaeology
 FOS602 Languages and Literature
 FOS603 Philosophy, Ethics and Religion
 FOS604 Art (art, history of art, performing art, music)
 FOS605 Other social sciences